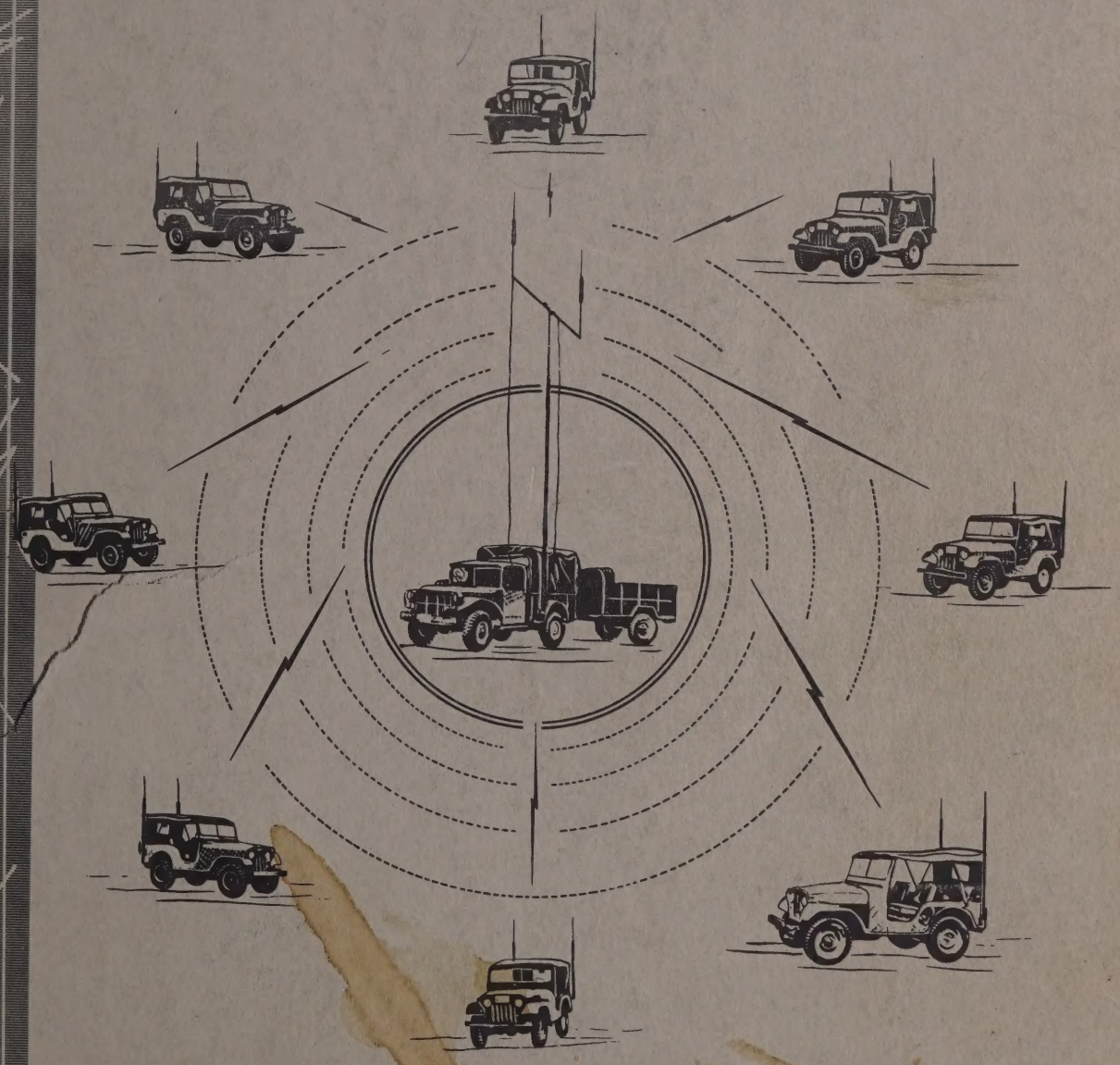
AN/MRC-66....

Communication Central

CENTRAL EQUIPMENT



MOTOROLA INC.
WESTERN MILITARY ELECTRONICS CENTER

COMMUNICATION CENTRAL AN/MRC-66( )
(CENTRAL EQUIPMENT)

BOOK 2 OF 2

SEPTEMBER 1, 1957

CONTRACT NO. DA 36-039 SC-72346

MOTOROLA INC.
WESTERN MILITARY ELECTRONICS CENTER

2000 VOLTS

WARNING

HIGH VOLTAGE
IS USED IN THE OPERATION
OF THIS EQUIPMENT

DEATH ON CONTACT
MAY RESULT IF OPERATING PERSONNEL
FAIL TO OBSERVE SAFETY PRECAUTIONS

2000 VOLTS

2000 VOLTS

WARNING

HIGH VOLTAGE
IS USED IN THE OPERATION
OF THIS EQUIPMENT

DEATH ON CONTACT
MAY RESULT IF OPERATING PERSONNEL
FAIL TO OBSERVE SAFETY PRECAUTIONS

2000 VOLTS

TABLE OF CONTENTS

TABLE OF CONTENTS (cont)

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (cont)

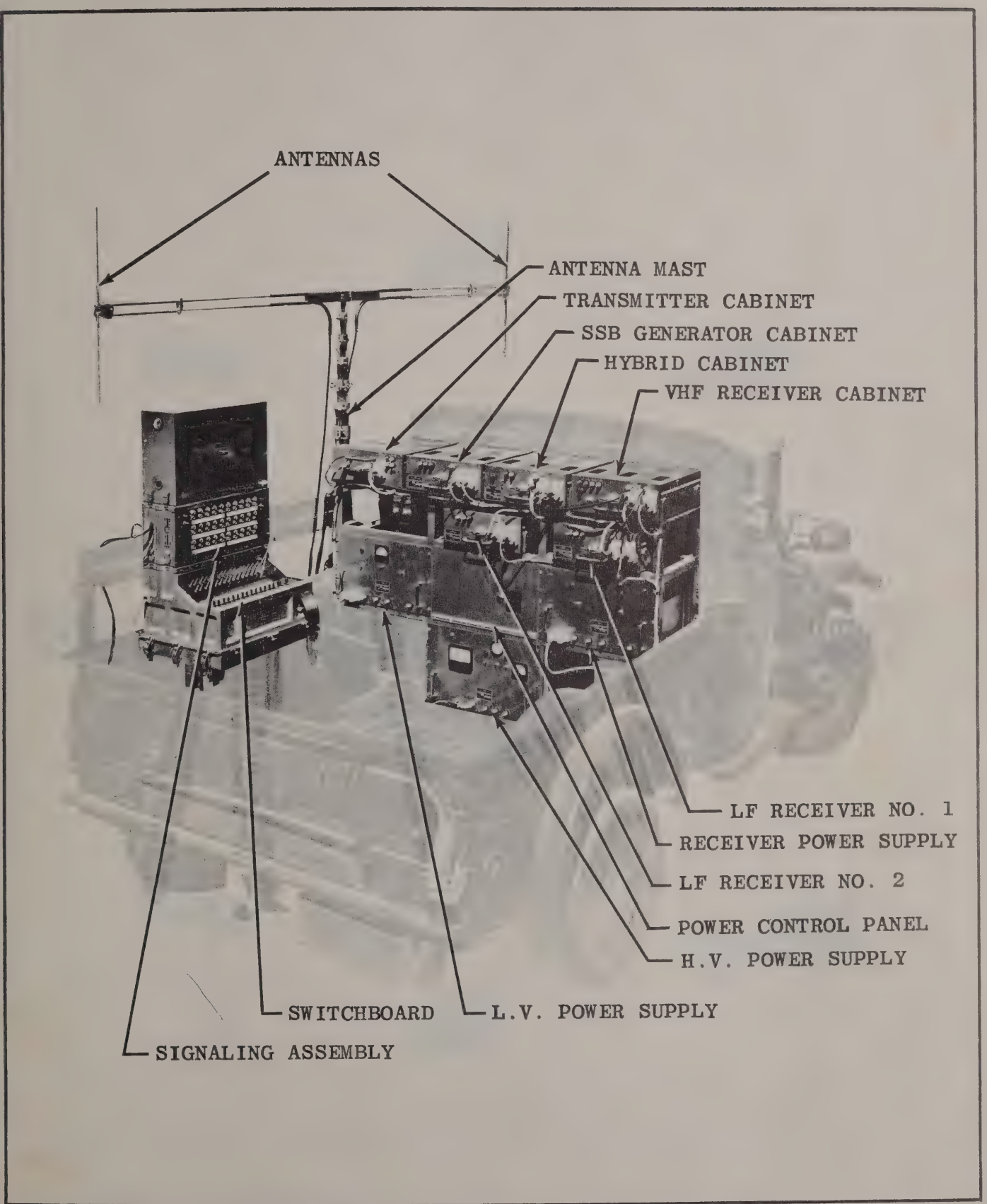


FIGURE 1.1 CENTRAL EQUIPMENT

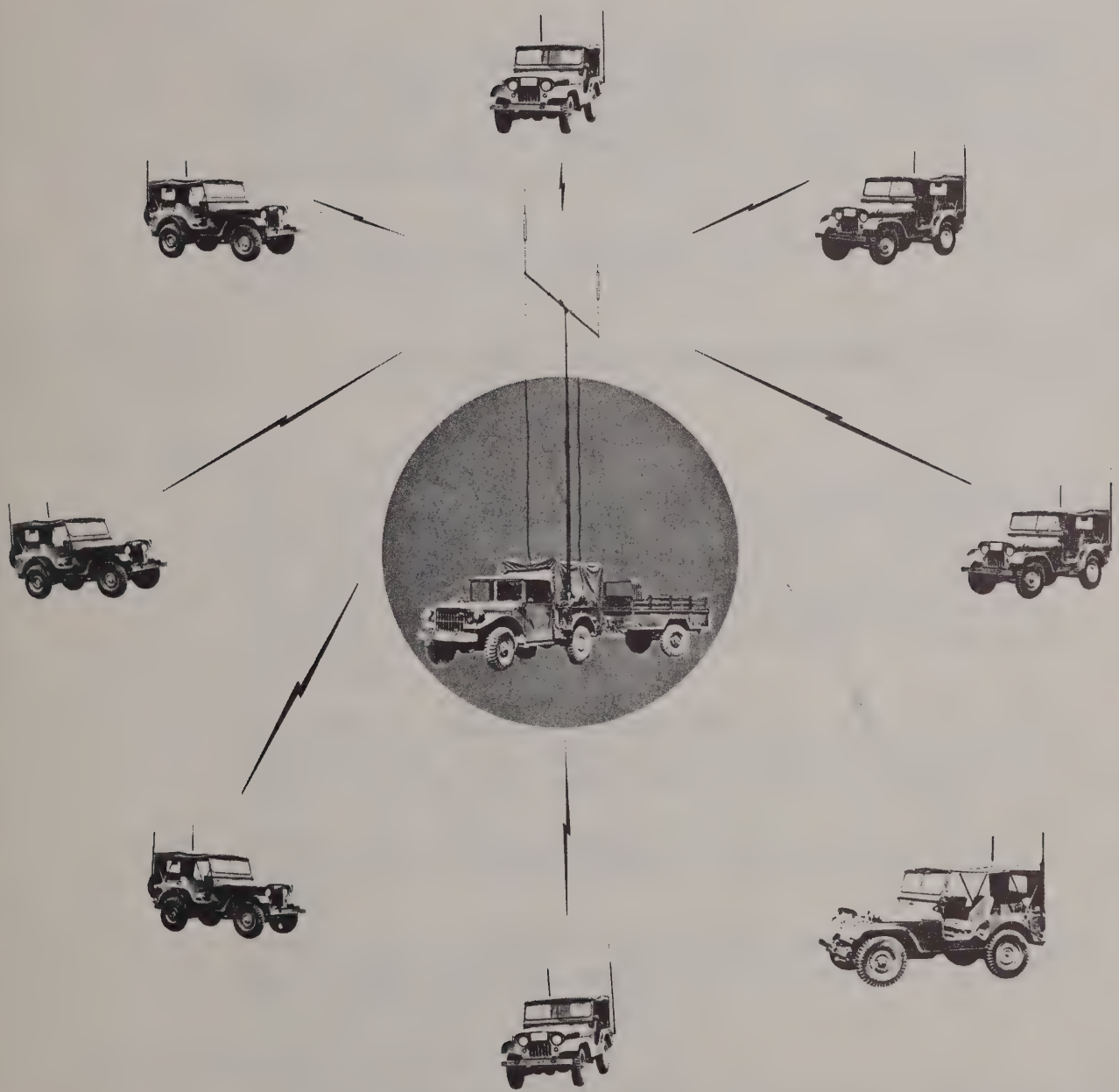


FIGURE 1.2 SYSTEM APPLICATION, AN/MRC-66 ( ).

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. This technical manual contains instructions for the operation and maintenance of the Central Equipment, Communication Central AN/MRC-66 ( ). (Figure 1.1). The information is intended for operators, and maintenance personnel of engineering level.

b. The Central station is designed to operate with sixteen Subscriber stations. The Subscriber equipments are described in Book One.

Section II. DESCRIPTION AND DATA

2. Purpose of Equipment

a. The purpose of the COMMUNICATION CENTRAL AN/MRC-66 ( ) is to provide a switched telephone service via Radio circuits. The objective is to furnish essentially the same type of telephone service that is normally provided with wire lines but to provide it to subscribers that are mobile and cannot be served with wire lines. See figure 1.2.

b. The CENTRAL equipment described in this manual will be installed in a three-quarter ton truck equipped with a trailer and gasoline driven motor generator.

c. Eight, full duplex channels are provided for subscriber use. These channels are on a party-line basis.

d. A Conference channel is provided for the subscribers. The Central station operates as an automatic relay station for this channel.

3. System Application

a. A system consists of sixteen Subscriber stations and one Central station A representative display of a portion of this network is shown in Figure 1.2.1

b. A MAIN and an ALTERNATE channel is provided to each Subscriber station. Subscribers operate through the Central station switchboard to communicate with other Subscribers.

c. Full duplex operation is provided, also call and busy signalling.

d Use of the Conference channel is arranged through the Central operator. The Central operator is not included in the conference and retransmission through the central station is automatic.

e. The NET channel provided to the Subscriber stations is not included in the Central station.

4. Technical Characteristics

Type of transmission and reception	Voice, calling and busy signalling
Frequency range	Semi-fixed V.H.F.
Operational facilities	Full duplex, monitoring, call and busy signalling, party line channel, and a conference channel.
Type of tuning	Pre-set.
Communication range	10 miles over average terrain.
Total power drain	20 amperes at 120 volts 60 cycle AC.

5. List of Components.

1. Mounting Rack
1. Transmitter Cabinet
1. SSB Generator Cabinet
1. Hybrid Cabinet
1. VHF Receiver Cabinet
2. LF Receiver Cabinets
1. LV Power Supply Cabinet (Transmitter)
1. Control Panel, Main Power
1. Power Supply (Receiver)
1. Power Supply, High Voltage
1. Signalling Cabinet
1. Switchboard, SB-86P GFP
1. Switchboard Mounting Rack GFP
1. Headset/Handset GFP
1. Switchboard Power Supply GFP
1. Gasoline Generator GFP
1. Antenna Mast GFP

1. Microphone (M29) GFP
1. Headset GFP
1. Speaker GFP
1. Antenna Assembly
   Cable Assemblies
   Miscellaneous Equipment
   Running Spares

6. Additional Equipment Required

   a. One, three quarter ton truck with trailer.

7. General System Description

   a. A complete Communication Central AN/MRC-66 ( ) system consists of: one Central station and sixteen Subscriber stations

   b. The voice frequency channels, busy, and ringing tones have been pre-set in the stations. For details of frequency allocation see Figure 1.3.1 For Subscriber channels and vibrasponder assignments see Figure 1.4.1

8. VHF Receiver Cabinet

   a. The VHF receivers in the two Central units are very similar in structure, function, and detailed circuit and mechanical arrangement. They differ from each other only in their operating frequencies and in those components which determine the frequencies.

   b. Receiver characteristics pertinent to system operation are displayed in Figure 1.3.

   c. Schematic diagram of the receivers is displayed in the Maintenance Section of this manual. (Figure 4.3c)

9 Low Frequency Receiver Cabinets

   a. Two Low Frequency Receiver Cabinets are provided with each Central Station.

   b. Each receiver passes the AGC, audio, and squelch control for four subscriber channels.

   c. Schematic diagram is in the Maintenance Section of this manual. (Figure 4.5c)

10. Transmitter Cabinet

   a. The transmitters in the two Central Stations are

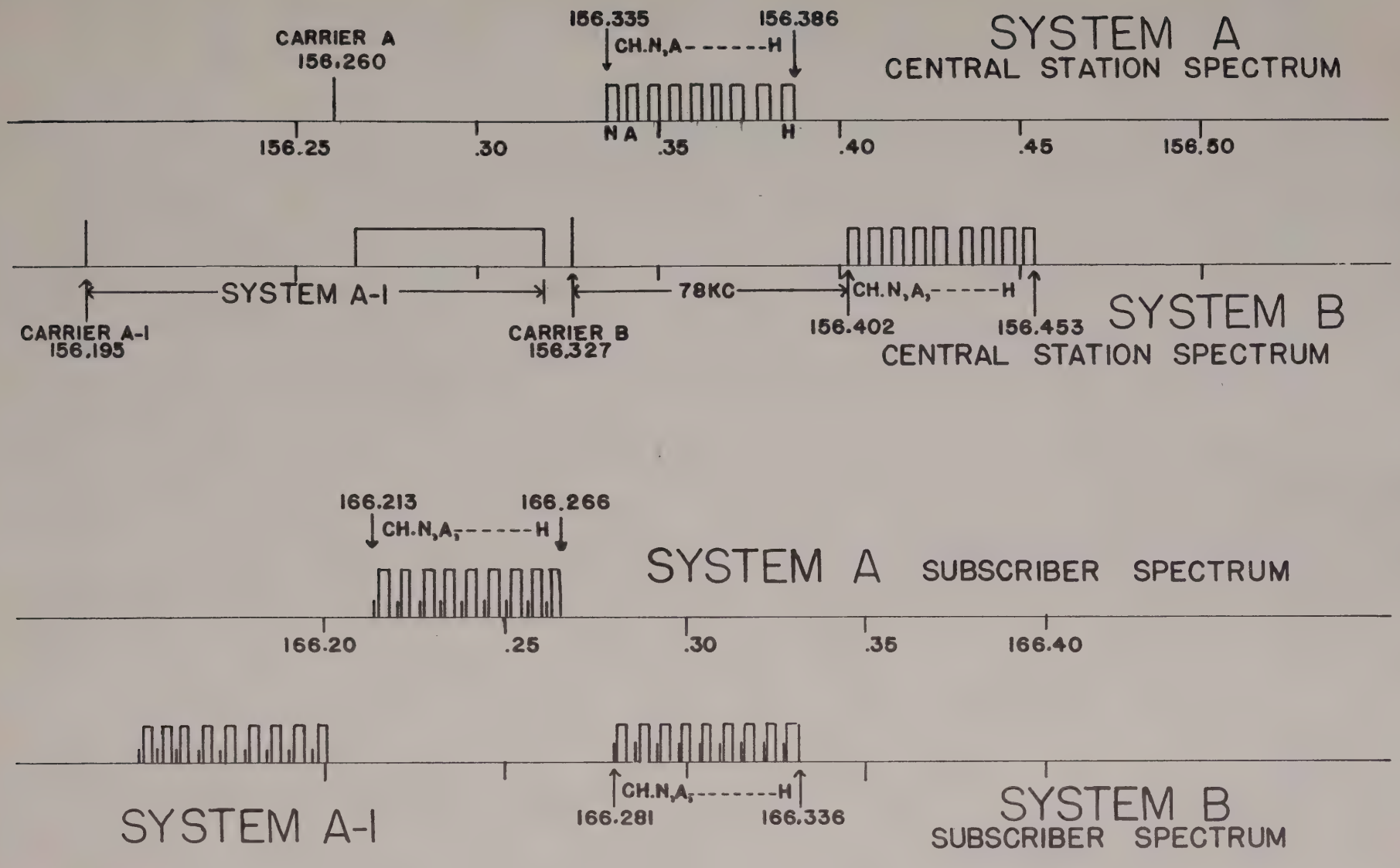
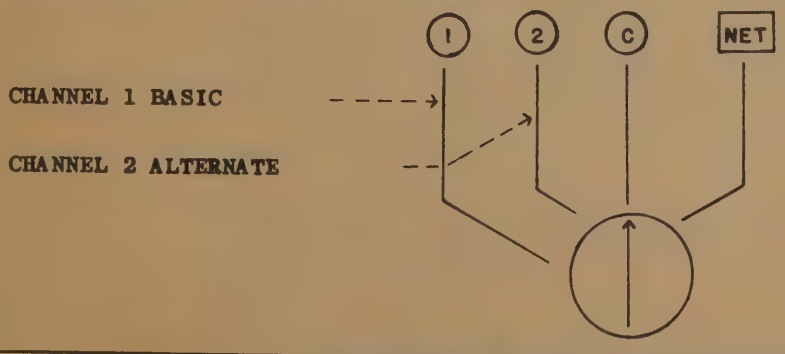


FIGURE 1.3 COMMUNICATION CENTRAL FREQUENCY ASSIGNMENT

SUBSCRIBER NUMBER	CHANNEL 1 LINE XTAL	CHANNEL 2 LINE XTAL	CONFERENCE LINE XTAL	BUSY TONE VIBRASPONDER-DECODER Z3	Z4	Z5	CALL TONE VIBRASPONDER-DECODER Z2	Z1
1	A 368Kc	B 362Kc	N 374Kc	1084	977.2	473.2	100	110.9
2	A 368Kc	B 362kc	N 374kc	1084	977.2	473.2	100	123.0
3	B 362kc	C 356kc	N 374kc	977.2	881.0	473.2	100	136.5
4	B 362kc	C 356kc	N 374kc	977.2	881.0	473.2	100	151.4
5	C 356kc	D 350kc	N 374kc	881.0	794.3	473.2	100	167.9
6	C 356kc	D 350kc	N 374kc	881.0	794.3	473.2	100	186.2
7	D 350kc	E 344kc	N 374kc	794.3	716.1	473.2	110.9	100
8	D 350kc	E 344kc	N 374kc	794.3	716.1	473.2	110.9	123.0
9	E 344kc	F 338kc	N 374kc	716.1	645.7	473.2	110.9	136.5
10	E 344kc	F 338kc	N 374kc	716.1	645.7	473.2	110.9	151.4
11	F 338kc	G 332kc	N 374kc	645.7	582.1	473.2	110.9	167.9
12	F 338kc	G 332kc	N 374kc	645.7	582.1	473.2	110.9	186.2
13	G 332kc	H 326kc	N 374kc	582.1	524.8	473.2	123.0	100.0
14	G 332kc	H 326kc	N 374kc	582.1	524.8	473.2	123.0	110.9
15	H 326kc	A 368kc	N 374kc	524.8	1084.0	473.2	123.0	136.5
16	H 326kc	A 368kc	N 374kc	524.8	1084.0	473.2	123.0	151.4
17	A 368kc	B 362kc	N 374kc	1084.0	977.2	473.2	123.0	167.9
18	A 368kc	B 362kc	N 374kc	1084.0	977.2	473.2	123.0	186.2
19	B 362kc	C 356kc	N 374kc	977.2	881.0	473.2	136.5	100.0
20	B 362kc	C 356kc	N 374kc	977.2	881.0	473.2	136.5	110.9
21	C 356kc	D 350kc	N 374kc	881.0	794.3	473.2	136.5	123.0
22	C 356kc	D 350kc	N 374kc	881.0	794.3	473.2	136.5	151.4
23	D 350kc	E 344kc	N 374kc	794.3	716.1	473.2	136.5	167.9
24	D 350kc	E 344kc	N 374kc	794.3	716.1	473.2	136.5	186.2
25	E 344kc	F 338kc	N 374kc	716.1	645.7	473.2	151.4	100.0
26	E 344kc	F 338kc	N 374kc	716.1	645.7	473.2	151.4	110.9
27	F 338kc	G 332kc	N 374kc	645.7	582.1	473.2	151.4	123.0
28	F 338kc	G 332kc	N 374kc	645.7	582.1	473.2	151.4	136.5
29	G 332kc	H 326kc	N 374kc	582.1	524.8	473.2	151.4	167.9
30	G 332kc	H 326kc	N 374kc	582.1	524.8	473.2	151.4	186.2
31	H 326kc	A 368kc	N 374kc	524.8	1084.0	473.2	167.9	100
32	H 326kc	A 368kc	N 374kc	528.8	1084.0	473.2	167.9	110.9



SUBSCRIBER CHANNEL AND VIBRASPONDER ASSIGNMENTS

FIGURE 1.4

identical in structure, function, and detailed circuit and mechanical arrangement. They differ from each other only in their operating frequencies and the components that determine these frequencies.

b. Schematic diagram of the transmitter is displayed in the Maintenance Section of this manual. (Figure 4.8c)

11. Single Sideband Generator Cabinet

a. The SSB Generator Cabinet contains nine single sideband generators for the channels A through H and channel N.

b. Schematic Diagram of the SSB Generator Cabinet is displayed in the Maintenance Section of this manual. (Figure 4.11c)

12. Hybrid Cabinet

a. The Hybrid Cabinet contains nine hybrid units for the channels A through H and channel N.

b. Schematic Diagram of the Hybrid Cabinet is displayed in the Maintenance Section of this manual. (Figure 4.13c)

13. Signalling Cabinet

a. The Signalling Cabinet contains the tone oscillators, busy-tone commutator, and the power supply, timer and call tone switching unit.

b. The Schematic Diagram of this cabinet is displayed in the Maintenance Section of this manual. (Figure 4.15c).

14. Manual Telephone Switchboard (SB-86/P)

a. Operation and Technical Data for this unit will be found in military manual: Instruction Book for Manual Telephone Switchboard SB-86P. Order number 1669-P-51 dated 24 September 1954.

15 Power Supply, Receiver

a. The Receiver Power Supply provides the heater voltages and plate voltages for the VHF receiver and the two LF receivers.

b. Circuit details are displayed in the Maintenance Section of this manual. (Figure 4.19D)

16. Low Voltage Power Supply, Transmitter

a. This power supply provides filament voltage and plate voltage to the transmitter. High voltage to the final amplifier is provided by another power supply.

b. Details of circuitry and layout are displayed in the Maintenance Section of this manual. (Figure 4.20A, B, C and D)

17. High Voltage Power Supply, Transmitter

a. This power supply provides a regulated 300 V DC and an unregulated 2000 V DC to the transmitter.

18. Control Panel, Main Power

a. This panel controls the main power source with associated meters and time clock.

19. Antennas, Receiving and Transmitting

a. The receiving and transmitting antennas are mounted on a crossbar This bar is elevated and lowered by a "crank-up" antenna mast.

20. Miscellaneous Equipments

a. Miscellaneous equipments consist of: cables, wire, hardware etc.

21. Running Spares

a. A list of the Running Spares provided will be found in the back of this manual

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. MODES OF OPERATION

22. Monitoring

a. The Central operator can monitor any occupied channel by pressing the associated switch to the forward position. Both sides of the conversation will be monitored by the Central operator.

23. Calling

a. To call a Subscriber, the Central operator selects the proper drop jack and inserts an operator's plug in this jack. He then presses the associated switch lever forward. This series of operations connects the Central operator to the Subscriber channel. The Central operator presses the appropriate button on the Signalling Unit to call the Subscriber.

24. Answering a Call

a. An incoming call is indicated by a drop on the switchboard. The Central operator plugs an operator's cord into the jack and presses the associated operator's key forward. Full duplex conversation can then be carried on.

25. Busy Signalling

a. Busy signalling is not required from the Central station.

b. Busy signalling from the Subscriber is in the form of a 2000 cycle tone.

26 Duplex Operation

a. Full duplex operation is provided on the main and auxiliary channels.

b. Duplex operation is not provided on the Conference and Netting channels.

27. Conference Calls

a. Conference calls are arranged by the Central operator and Subscribers are directed to the Conference channel.

28. Subscriber Netting

a. Subscriber netting is a provision in the Subscriber stations only.

b. Netting is used when the Central station is inoperative or under other emergency conditions.

Section II. CONTROLS AND INSTRUMENTS

29. General

a. All of the normal operational controls are located on the Switchboard and Signalling Unit.

b. The controls associated with frequency etc., are located in the cabinets. These controls are pre-set and require no manipulation by the operator.

30. Manual Telephone Switchboard SB-86 P

a. Operating instructions for this switchboard are contained in the military manual titled: INSTRUCTION BOOK for MANUAL TELEPHONE SWITCHBOARD SB-86 P.

31. Signalling Unit

a. The operating controls on the signalling unit consist of an ON/OFF switch and thirty-two push-buttons.

b. The power switch will remain in the ON position except for the removal or repair of this unit.

c. Operation of the CALL buttons will be described in Section III.

Section III. OPERATION

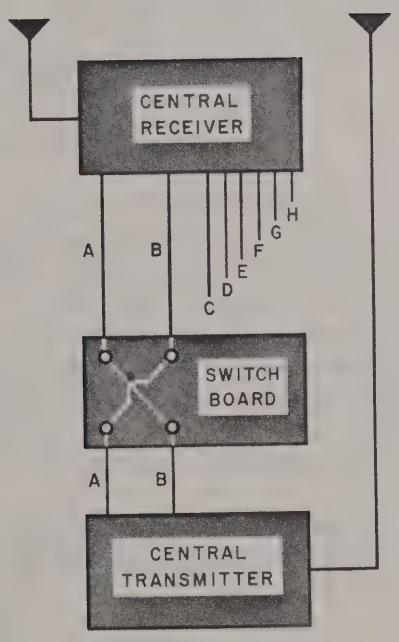
32. Operational Procedure

a. Operation of the Central Units involves the following procedures:

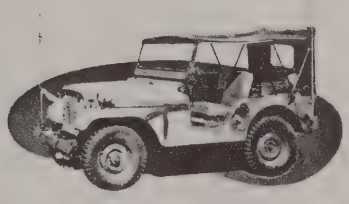
(1) Main Power Switch in OFF position.
(2) Start generator and set voltage level at 117V.
(3) Raise antenna to desired elevation.
(4) Assure that all CABINET power switches are in ON position.
(5) Place MAIN power switch in ON position. (After one minute, time delay relay will energize).

(6) Operate as directed under sub-heading 23. Paths of operation are displayed in Figure 2.1.

CHANNEL A
SUBSCRIBER #1



MOBILE RADIO CENTRAL



CHANNEL B
SUBSCRIBER #5

FIGURE 2.1

CALLING OPERATION

CHAPTER 3

THEORY OF OPERATION

Section I. INTRODUCTION

33. Scope

a. System theory is presented to provide an understanding of how the several units are inter-related in the various operations of the radio sets. Such an understanding is an effective aid in trouble shooting the equipment to isolate a defective unit.

b. Detailed circuit theory of individual units is not discussed, except insofar as the units are interconnected in a common circuit. Most of the information presented in this chapter is concerned with system application of the several units. Schematic and layout details on the individual units are published in the MAINTENANCE section.

34 Basic System Block Diagram

a. Basically each of the central sets consists of: a VHF receiver cabinet, two LF receiver cabinets, a transmitter cabinet, a single sideband generator cabinet, a hybrid cabinet, a signalling cabinet, and a manual telephone switchboard. These basic units are the essentials of the system. The power supplies, cables, mountings and miscellaneous equipment are supplied to make the basic units perform their function of transmitting and receiving.

b. A typical basic system block diagram of the Radio Central System is displayed in Figure 3.1.

35. System Diagrams

a. Figure 3.2 is the block diagram for the Central set.

b. Figures 4.1 and 4.2 are the cabling diagrams. Power and Signal respectively.

c. Figures 4.3A, 4.3B and 4.3C display the VHF receiver cabinet.

d. Figure 4.4 displays the VHF Receiver Schematic Diagram.

e. Figures 4.5A, B and C display the Low Frequency Receiver Cabinet. Figure (A) is top view, (B) is

bottom view, and (C) is schematic diagram of intra-unit wiring.

f. Figures 4.6 displays the Low Frequency Receiver Schematic Diagram.

g. Figure 4.7 displays the Exalted Carrier Detector Schematic Diagram.

h. Figures 4.8A, B, and C display the Transmitter Cabinet. Figures A and B are top and bottom views respectively. Figure C is the Schematic Diagram of intra-unit wiring.

i. Figure 4.9 displays the Low Power RF Driver Schematic Diagram.

j. Figure 4.10 displays the Power Amplifier Schematic Diagram.

k Figures 4.11A, B, and C display the Single Sideband Generator Cabinet. Figure A is top view, B is bottom view and C is the Schematic Diagram of intra-unit wiring.

l. Figure 4.12 displays the Single Sideband Generator Schematic Diagram.

m. Figures 4.13A, B, and C display the Hybrid Cabinet. Figures A and B are the top and bottom views respectively. Figure C is the Schematic Diagram of intra-unit wiring.

n. Figure 4.14 displays the Hybrid Unit Schematic Diagram.

o. Figures 4.15A, B, and C display the Signalling Cabinet. Figure A is the front view, Figure B is the rear view and Figure C is the Schematic Diagram of intra-unit wiring.

p Figures 4.16A, B, and C display the Tone Oscillator Unit. Figures A and B are the top and bottom views respectively. Figure C is the Schematic Diagram.

q. Figures 4.17A, B, and C display the Busy Tone Commutator Unit. Figures A and B are the top and bottom views respectively. Figure C is the Schematic Diagram.

r. Figures 4.18A, B, and C display the Power Supply, Timer and Call Tone Switching Unit. Figures A and B

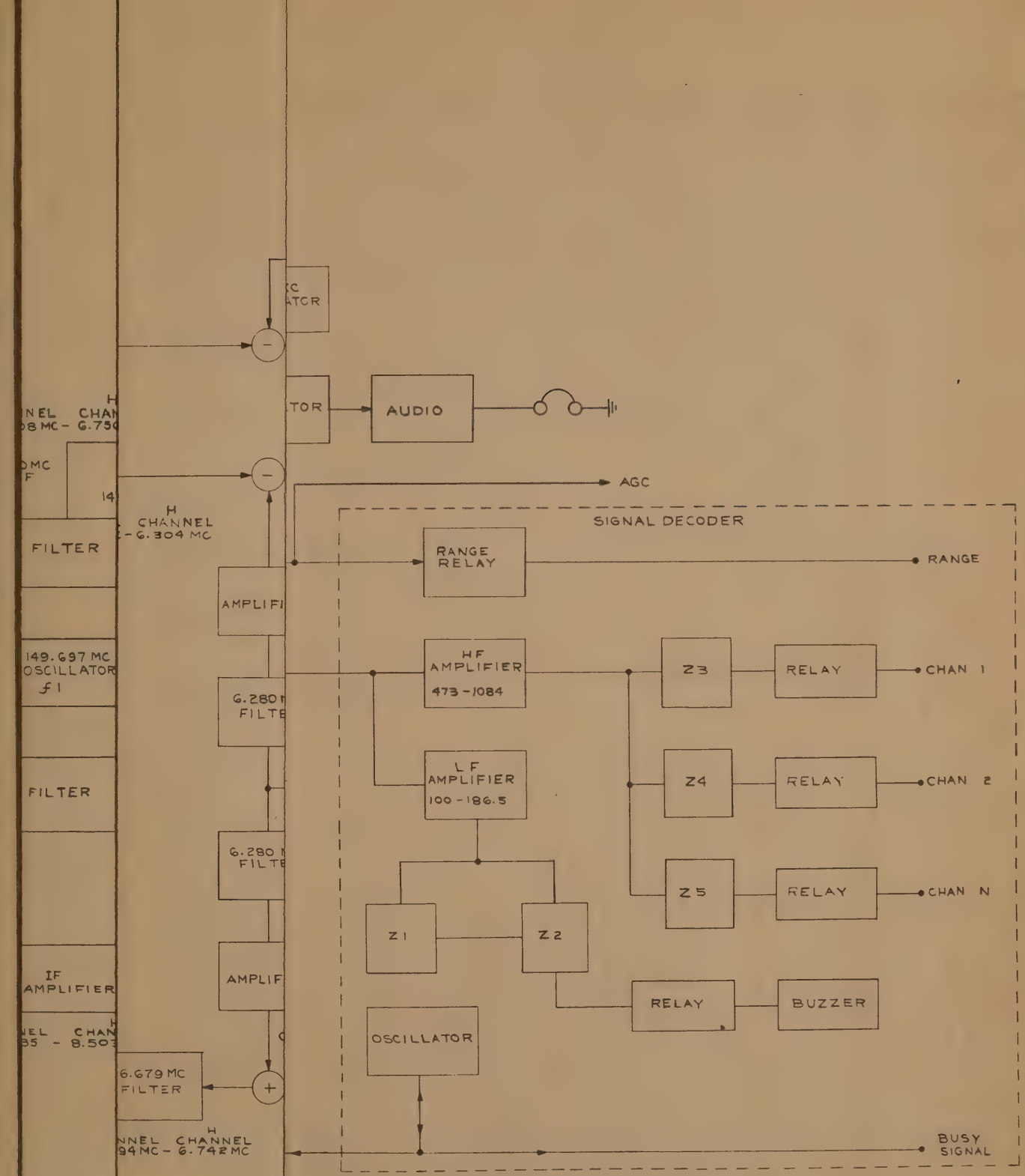


FIGURE 3.1
RADIO CENTRAL SYSTEM

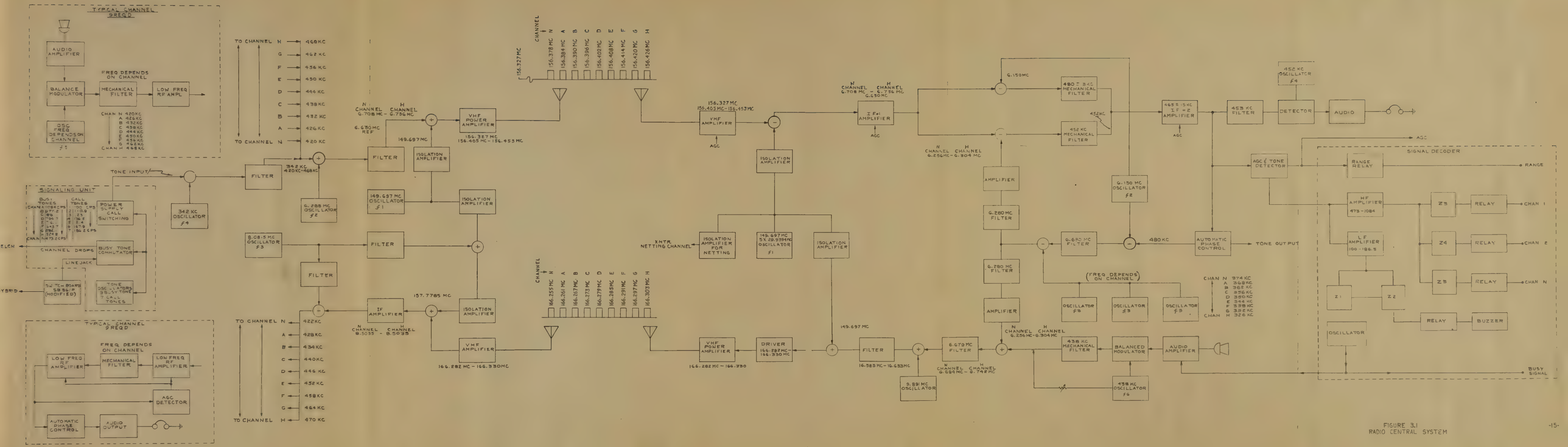


FIGURE 3.1
RADIO CENTRAL SYSTEM

are the top and bottom views respectively. Figure C is the Schematic Diagram.

s. Figures 4.19A, B, C, and D display the Receiver Power Supply Cabinet. Figures A, B, and C are the front view, top view and bottom view respectively. Figure D is the Schematic Diagram.

t. Figures 4.20A, B, C, and D display the Transmitter Low Voltage Power Supply. Figures A, B, and C are the front view, top view and bottom view respectively. Figure D is the Schematic Diagram.

u. Figures 4.21A, B, C, and D display the Transmitter High Voltage Power Supply. Figures A, B, and C are the front view, top view and bottom view respectively. Figure D is the Schematic Diagram.

Section II. POWER DISTRIBUTION AND CONTROL CIRCUITS

36. General Description

a. The source of power for this equipment is a generator, driven by a gasoline engine and mounted in a trailer.

b. Power from this generator is delivered to the Control Panel, Main Power for further distribution.

c. Details of power distribution is displayed in Figure 4.1.

d. Details of signal distribution is displayed in Figure 4.2.

CHAPTER 4

MAINTENANCE

Section I. TROUBLE SHOOTING

37. General

a. Trouble-shooting of this equipment is expected to be handled by engineers or highly competent technicians.

b. These units are factory adjusted with special laboratory equipment. (See Section II). Readjustment in the field should not be attempted without this special equipment.

c. Primary trouble-shooting information is graphically displayed in photographs, charts and schematic diagrams. See Chapter 3, Section I, paragraph 35 for listings.

d. The basic schematic is shown in Figure 4.1 and proceeds through the drawings indicated in this figure.

Section II. ALIGNMENT PROCEDURES

38. General

While most of the alignment and adjustments of the COMMUNICATION CENTRAL equipment is largely conventional, some special equipment and procedures are required. The special equipment and procedures are described in paragraph 39 through paragraph 45 of this section.

39. Special Equipment

A Special Single Sideband Signal Generator has been designed and fabricated by Motorola. It is used to supply functions as outlined below.

(1) Subscriber testing

a. Reference carrier output. (156.260 mc or 156.326 mc)
b. O frequency channel marker for any two channels
c. 1000 cycle channel tone for any two channels
d. Provisions for injection of an external generator to provide additional tones as desired. The external generator can also be used to replace the carrier. Amplitude modulation can be used to simulate signalling.

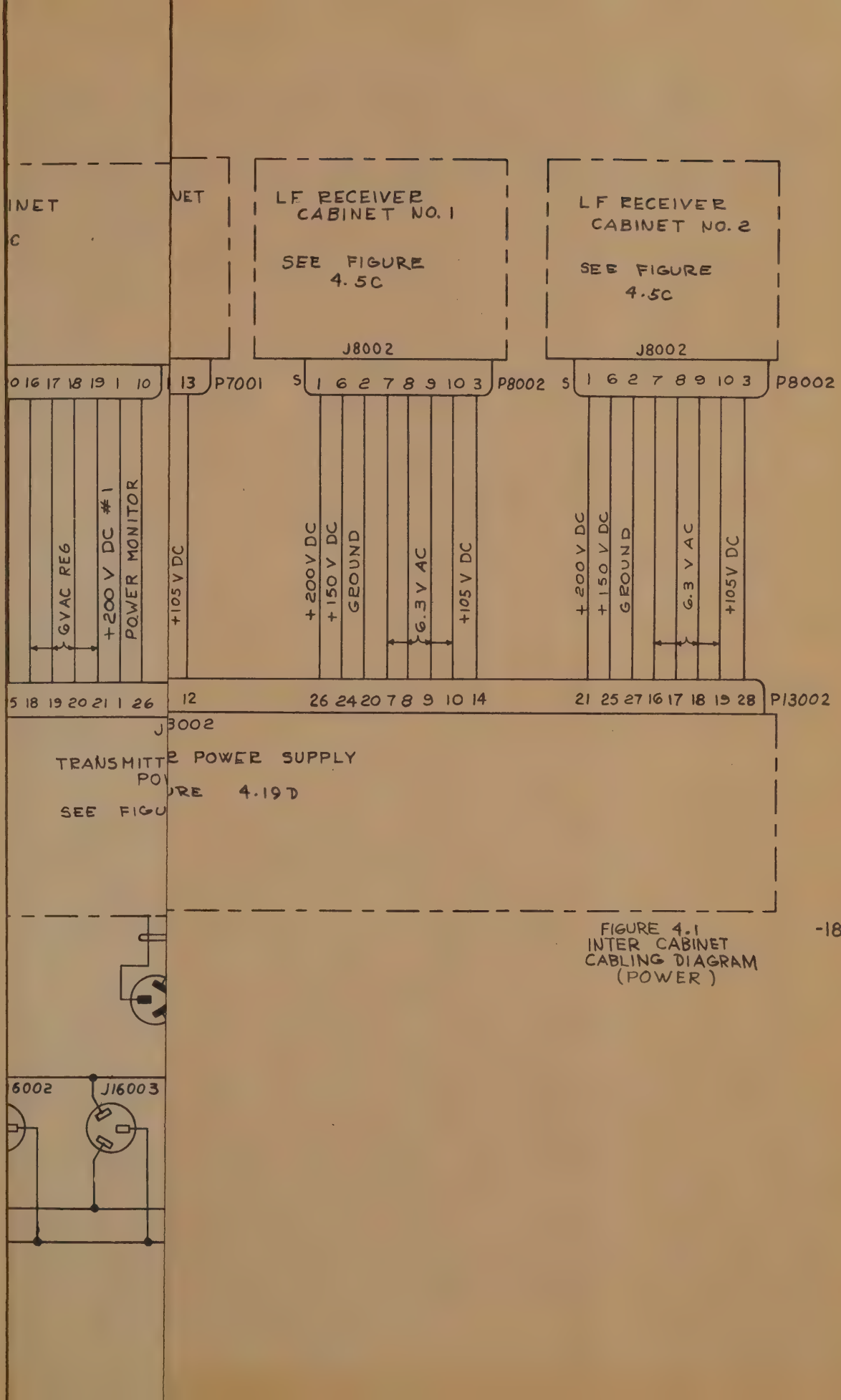
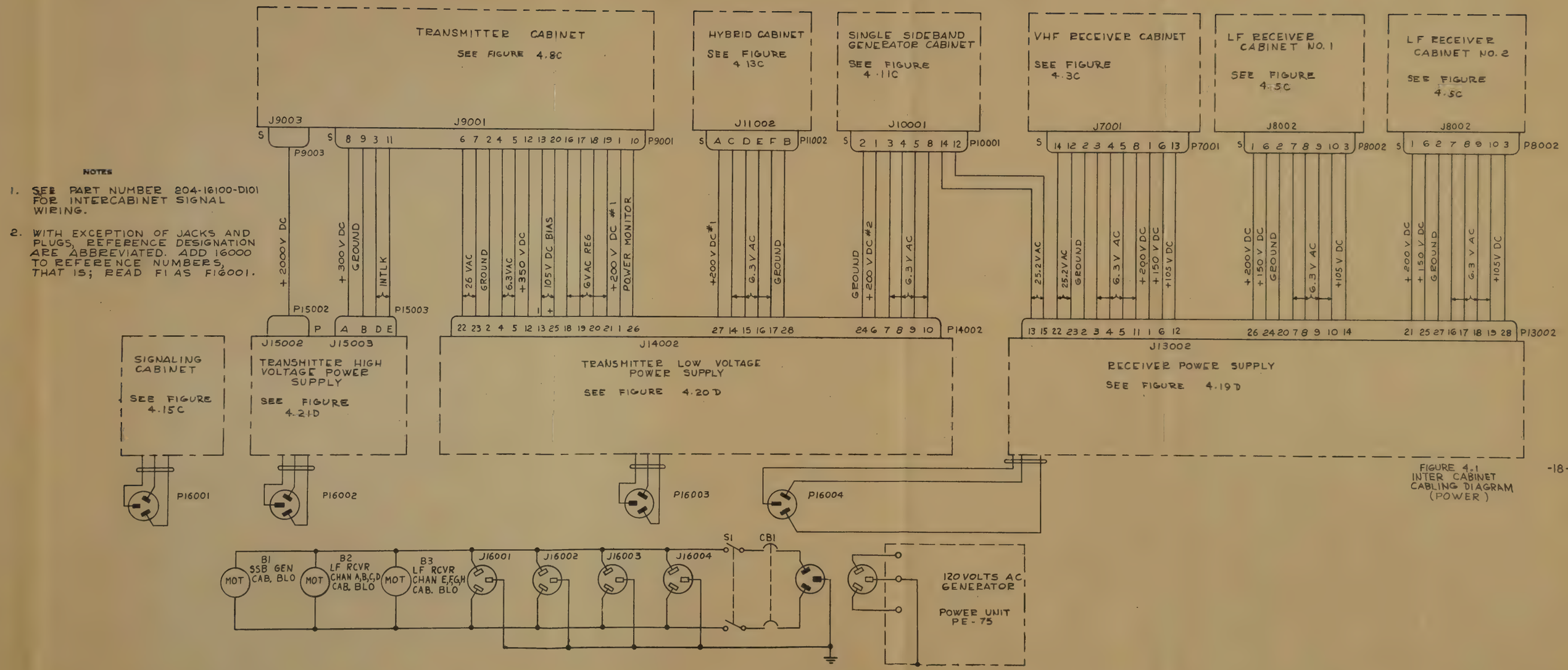


FIGURE 4.1
INTER CABINET
CABLING DIAGRAM
(POWER)



NOTES

1. SEE PART NUMBER 204-16100-D101 FOR INTERCABINET SIGNAL WIRING.
2. WITH EXCEPTION OF JACKS AND PLUGS, REFERENCE DESIGNATION ARE ABBREVIATED. ADD 16000 TO REFERENCE NUMBERS, THAT IS; READ F1 AS FIG001.

FIGURE 4.1
INTER CABINET CABLING DIAGRAM (POWER)

e. Level set adjustments are provided to that the relative level of carriers and tones can be varied, if desired.

(2) CENTRAL STATION testing

a Carriers for any two channels.
b. Tones for any two channels.
c. Provisions for external generator to substitute for carriers or tones.
d Independently adjustable amplitude of carrier and tones.

(3) Zero Beat Indicator

(a) Can be used with internal 480 kc oscillator to set APC to center frequency when correction is locked out.

(b) Can be used with any other oscillator in the 400 kc range by disconnecting the 480 kc oscillator and substituting the desired unit

(4) General

(a) R.F leakage out of the generator is negligible as determined by measurements with an R220/URR receiver and also by comparison with the HP 608 generator.

(b) The output attenuator calibration has been set up by comparison with a commercial signal generator which was calibrated at a lower frequency. The attenuator output was then compared with other generators in the lab as a second check of the calibration.

(c) When generating two signals with the generator, sum and difference spurious signals are produced that are down 30 db from the desired signal.

(d) The 149 mc oscillators output is down about 48 db on subscriber test position and about 60 db on base test position.

40. Hybrid Balance

a. Connect audio oscillator to channel A audio input terminal on front panel of Hybrid.

b. Connect channel A on Switchboard to any other channel.

c. Manually drop channel A drop.

d. Set audio oscillator frequency to 1800 cycles.

e. Set oscillator output to .5V, with 400-D.

f. Connect 400-D to audio output terminals on front panel of Hybrid.

g. Adjust channel A "null adjust" R2 on channel A hybrid for minimum voltages on 400-D.

h. Repeat steps A through G for channels B through H.

i. Adjust channel N to maximum counterclockwise position.

j. Adjust drops as indicated in Hybrid drop adjustment.

41. Receiver AGC Adjust

a. Connect Motorola SSB Signal Generator to VHF receiver antenna input.

b. Calibrate Signal Generator on channel N.

c. Set Signal Generator output to .25 uv with attenuator dial.

d. Adjust AGC voltage to 1 V with AGC adjust pot on channel N LF receiver IF amplifier R2.

e. Repeat steps B through D for channel A through H.

42. Hybrid Drop Adjustment

a. Connect Motorola SSB Signal Generator to UHF receiver antenna input.

b. Calibrate signal on channel N.

c. Set Signal Generator to .25 uv with attenuator dial.

d. Adjust R 11 on channel N Hybrid until white flag just shows on switchboard.

e. Decrease Signal Generator output to 1 uv and observe if white flag changes to black.

f. Adjust R 13 and then R 11 until white flag on switchboard operates on below .25 uv and off above .1 uv and yet will not oscillate.

g. Repeat steps B through F for channels A through H.

43. Sideband Generator Balance

a. Remove all coaxes from SSB Generators.

b. Connect 400-D (terminals shunted with 10 MH) through coax to channel N SSB Generator.

c. Adjust R 19 to maximum clockwise position.

d. Adjust R13 and C 10 for minimum voltage on 400-D.

e. Adjust R 19 to maximum counterclockwise position.

f. Repeat step B through E on SSB Generator channels A through H.

44. Average SSB Output to Peak SSB Output Ratio

a. Connect Audio oscillator to a pair of lines on the switchboard.

b. Connect 400-D to audio oscillator.

c. Connect oscilloscope to T.P. on SSB Generator channel N.

d. Connect audio oscillator at switchboard to channel N at switchboard.

e. Increase audio output (to approximately 1.25 V) until audio wave form on oscilloscope begins to clip on both sides.

f. Adjust R 19 on SSB Generator for 150 W on wattmeter connected to power amplifier output.

g. Decrease audio oscillator output to .25 V.

h. Adjust audio output control R 7 on Hybrid to 15 watts on wattmeter.

i. Repeat A through H until no more adjustment can be made.

j Repeat steps A through I for channels A through H.

45. Base Station Signalling Alignment

All controls in the signalling cabinet are present and checked at the time of manufacture. These controls should not be tampered with unless conditions clearly

indicate a malfunction of the signalling system.

a. Modulation Adjustment: Disconnect the channel drop plug from the busy tone commutator chassis and pull out all channel plugs from the switchboard. No signals should be present at the output of the signalling cabinet.

   Insert an 800 cycle tone on T.P. 1 of power supply chassis (lower deck of signalling cabinet); measure the output signal with an oscilloscope and VTVM. Adjust the level to just below the clipping level. Mark this voltage to a convenient scale on the oscilloscope. Using another oscilloscope to monitor the modulation patterns of the 300 - 500 KC amplifier in the transmitter, adjust the modulation level to 30% by the crest and trough method. See the block diagram of Figure 4.2B.

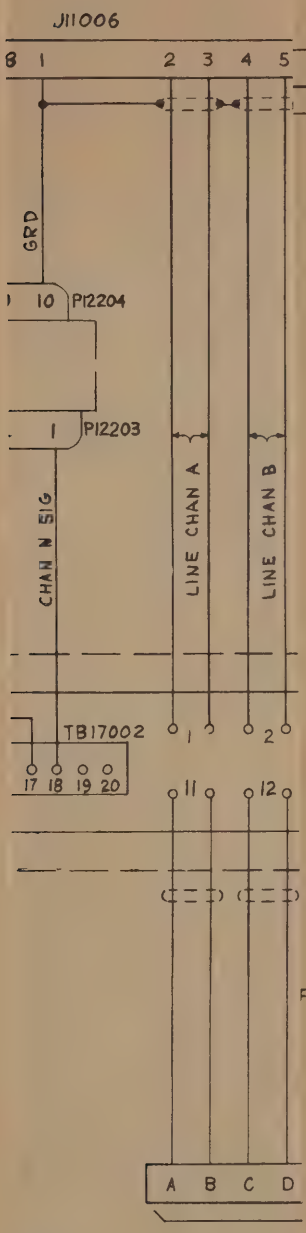
b. Adjustment of Tones: Remove the 800 cycle oscillation from TP 1.

   Connect the channel drop simulation chassis to the channel drop jack on the busy tone commutator chassis. Switch channel A on and adjust Z9 for the equivalent just below the clipping level as marked on the oscilloscope. Adjust channels B to N in a similar manner. Check only one tone at a time. All tones coming out should be at the same level and should modulate the transmitter 30% each time.

   The call tones may be adjusted in a similar manner except the output of each stage should be jumpered from TP 1 on the power supply chassis to each test point on the tone oscillator chassis. For example to adjust the 100 cycle - jumper TP 16 to TP 1. Adjust Z16 for the equivalent just below the clipping level as previously. Adjust each tone in a similar manner.

c. Call Tone Pulse Length: Adjust oscilloscope for one second sweep time across scope face.

   Trigger scope by running a jumper from trigger input to TP e on power supply chassis. Press pushbutton 1 and observe duration of each of the two pulses. Pulse one should be 0.7 seconds long. Pulse two should be 0.3 seconds long. Make these adjustments by varying R 11 and R 15.


J11006
8 1 2 3 4 5
GRD
10 P12204
1 P12203
CHAN N SIG
LINE CHAN A
LINE CHAN B
TB17002
1 2
17 18 19 20
11 12
A B C D

RT OF
1001

HYBRID
SEE FIGURE 4.13C

J11006

20 21 22 23 24 25 26 27 28 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 P11006

CHAN N DROP
CHAN H DROP
CHAN G DROP
CHAN F DROP
CHAN E DROP
CHAN D DROP
CHAN C DROP
CHAN B DROP
CHAN A DROP
GRD

1 2 3 4 5 6 7 8 9 10 P12204

P12202 PART OF J12202

J12204
BUSY TONE COMMUTATOR
SEE FIGURE 4.17C
J12203

10 9 8 7 6 5 4 3 2 1 P12203

GRD
CHAN A SIG
CHAN B SIG
CHAN C SIG
CHAN D SIG
CHAN E SIG
CHAN F SIG
CHAN G SIG
CHAN H SIG
CHAN N SIG

LINE CHAN A
LINE CHAN B
LINE CHAN C
LINE CHAN D
LINE CHAN E
LINE CHAN F
LINE CHAN G
LINE CHAN H
LINE CHAN N

TB17001

TB17002

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

1 2 3 4 5 6 7 8 9

11 12 13 14 15 16 17 18

SWBD TERM. BD

E16101
ANT.

P9203

J9203 XMTR
SEE
FIGURES 4.8C AND 4.10

PART OF J9001

22 23 21 PART OF P9001

A B C D E F G H J K L M N P Q R J16101

8PR TEL WIRE LINES

J11001

20 21 22 23 24 25 26 27 28 1 11 12 13 14 2 3 4 5 10 19 6 7 8 9 15 16 17 18 P11001

CHAN A AUDIO
CHAN B AUDIO
CHAN C AUDIO
CHAN D AUDIO
CHAN E AUDIO
CHAN F AUDIO
CHAN G AUDIO
CHAN H AUDIO
CHAN N AUDIO

CHAN A AUDIO
CHAN B AUDIO
CHAN C AUDIO
CHAN D AUDIO
CHAN A SQUELCH
CHAN B SQUELCH
CHAN C SQUELCH
CHAN D SQUELCH

CHAN N SQUELCH
CHAN N AUDIO

CHAN E SQUELCH
CHAN F SQUELCH
CHAN G SQUELCH
CHAN H SQUELCH
CHAN E AUDIO
CHAN F AUDIO
CHAN G AUDIO
CHAN H AUDIO

1 2 3 5 9 20 21 22 23 24 25 26 27 28 P10002

J10002
SSB GENERATOR CABINET
SEE FIGURE 4.11C
J10003

P10003

9 4 8 3 7 2 6 1 20 25 21 26 22 27 23 28 PART OF P8001

PART OF J8001
LF RCVR NO1
SEE FIGURE 4.5C

P8003 J8003

PART OF J8001

16 10 17 11 18 12 19 13 PART OF P8001

W16101
450KC

CHAN A AGC
CHAN B AGC
CHAN C AGC
CHAN D AGC

23 25 22 26 21 27 20 28 9 4 8 3 7 2 6 1 PART OF P8001

PART OF J8001
LF RCVR NO 2
SEE FIGURE 4.5C

P8003 J8003

PART OF J8001

10 19 11 18 12 17 13 16 PART OF P8001

CHAN E AGC
CHAN F AGC
CHAN G AGC
CHAN H AGC

W16102
450KC

P7006 J7006
P7005 J7005

6 1 7 2 8 3 9 4 16 10 19 13 P7002

P7002
VHF RCVR
SEE FIGURE 4.3C

23 28 22 27 21 26 20 25 P7002

P7007 J7007

FIGURE 4.2A-2
INTRACABINET
SIGNAL WIRING

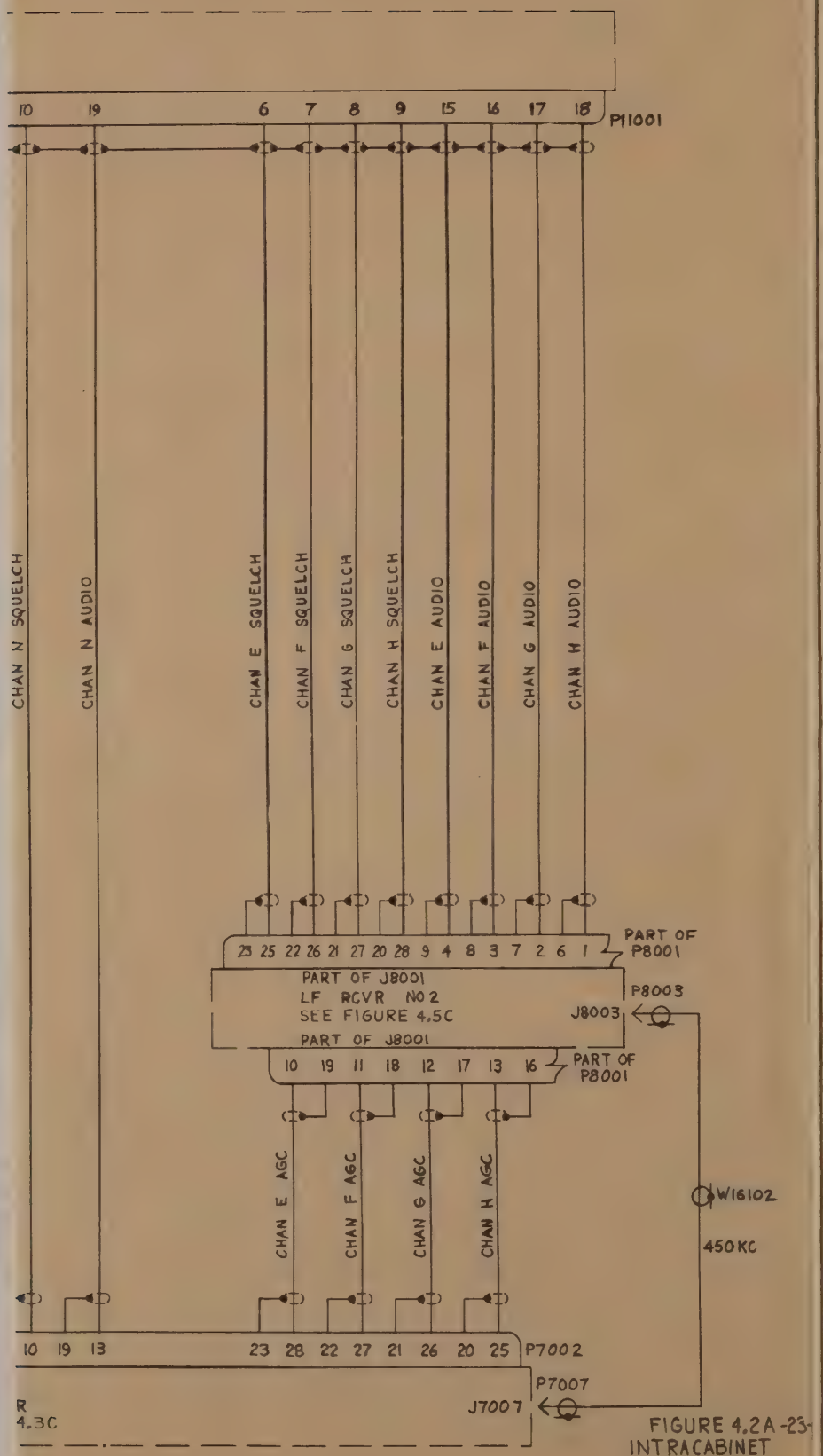
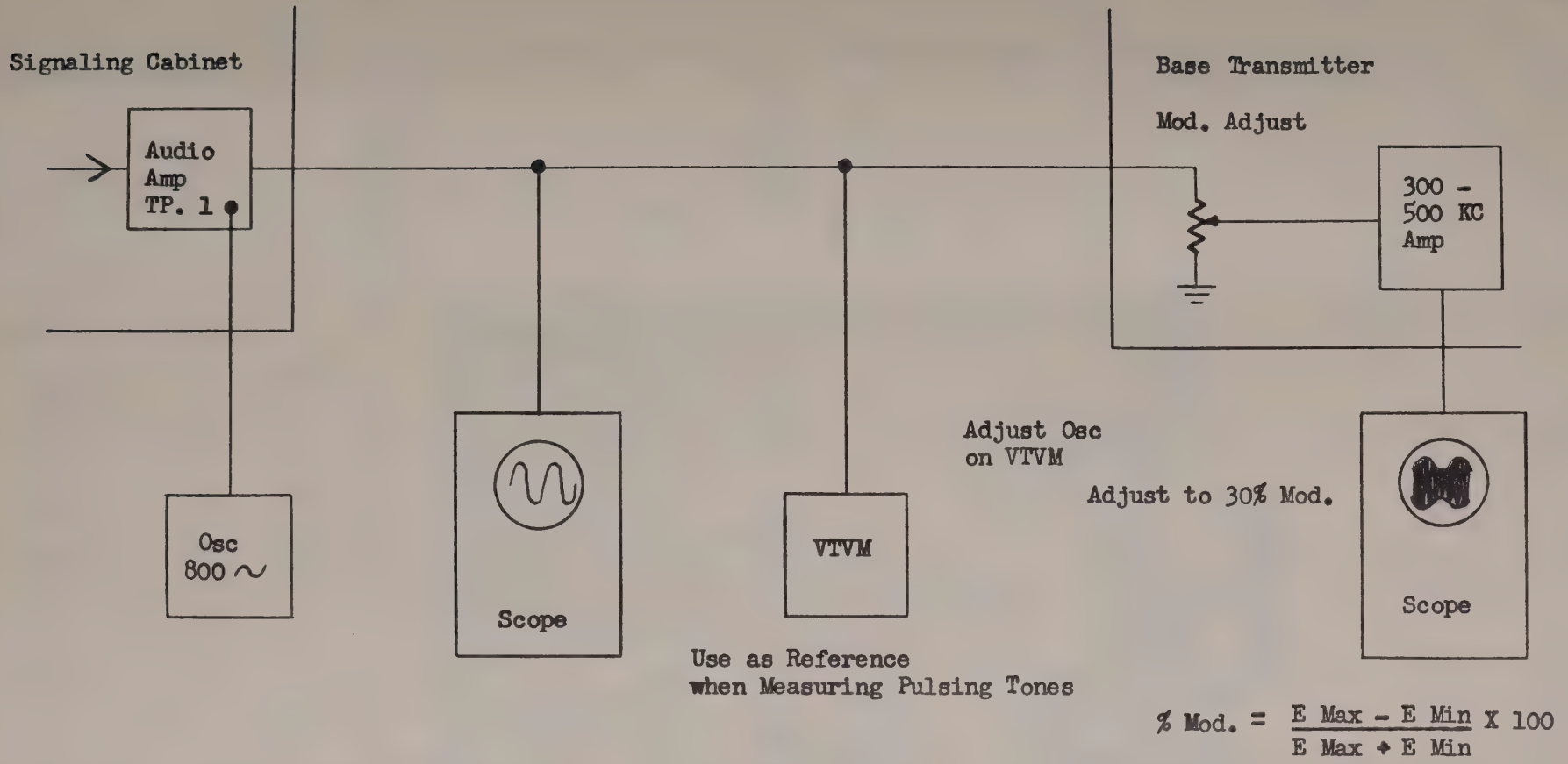


FIGURE 4.2A-23
INTRACABINET
SIGNAL WIRING



BLOCK DIAGRAM SHOWING METHOD OF SIGNALING SYSTEM ALIGNMENT

FIGURE 4.2B

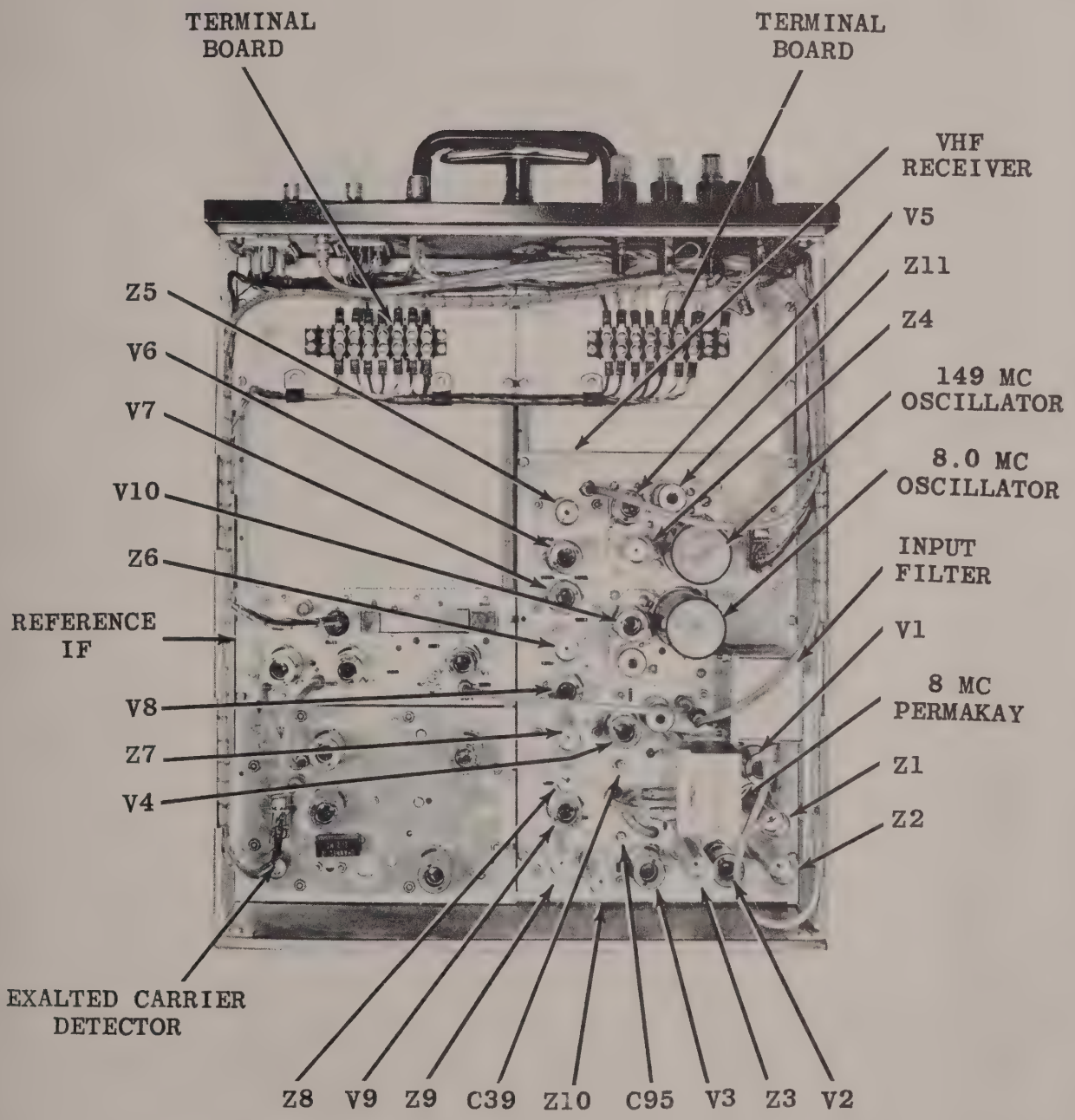


FIGURE 4.3A. VHF RECEIVER CABINET (TOP VIEW)

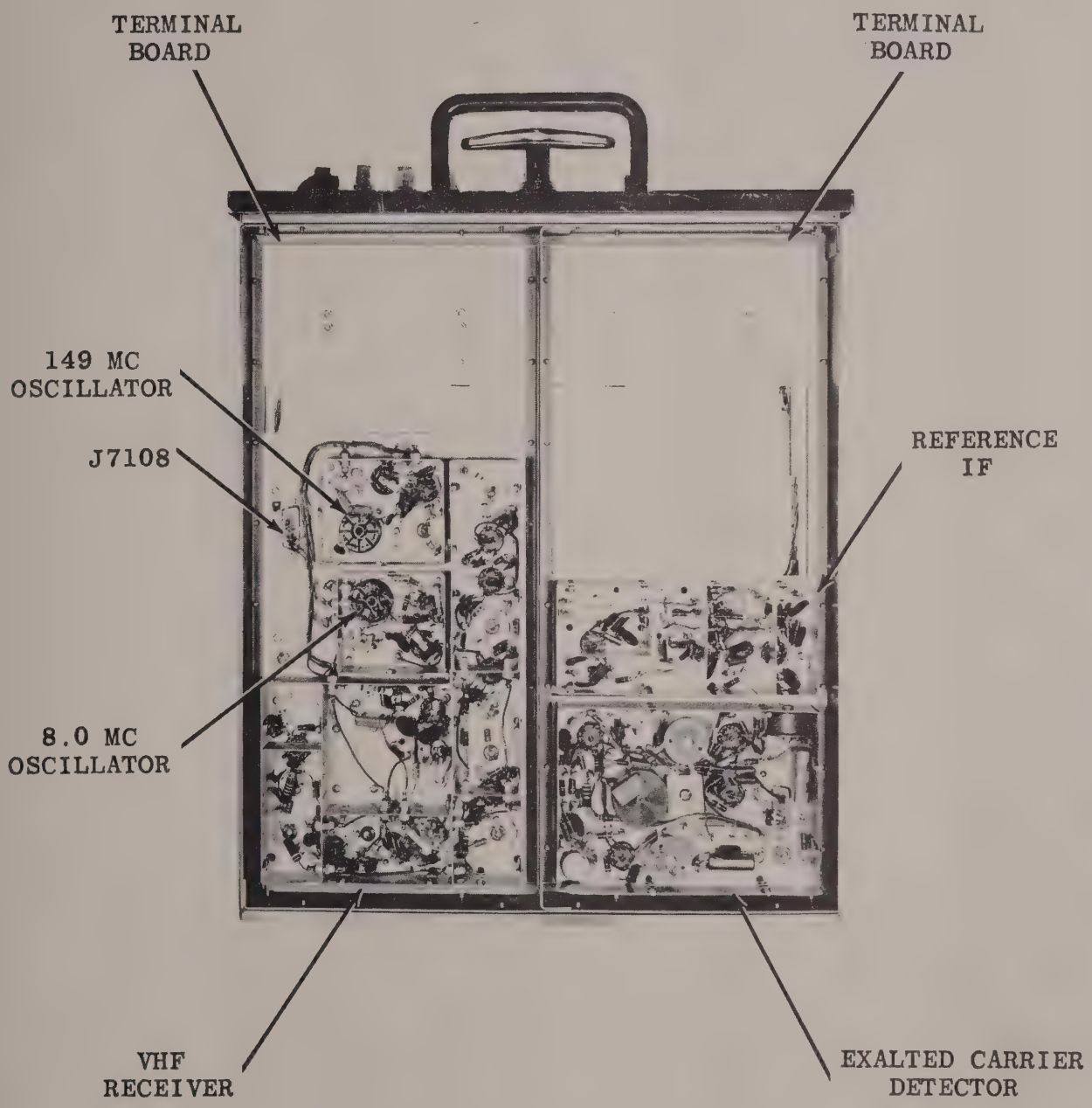
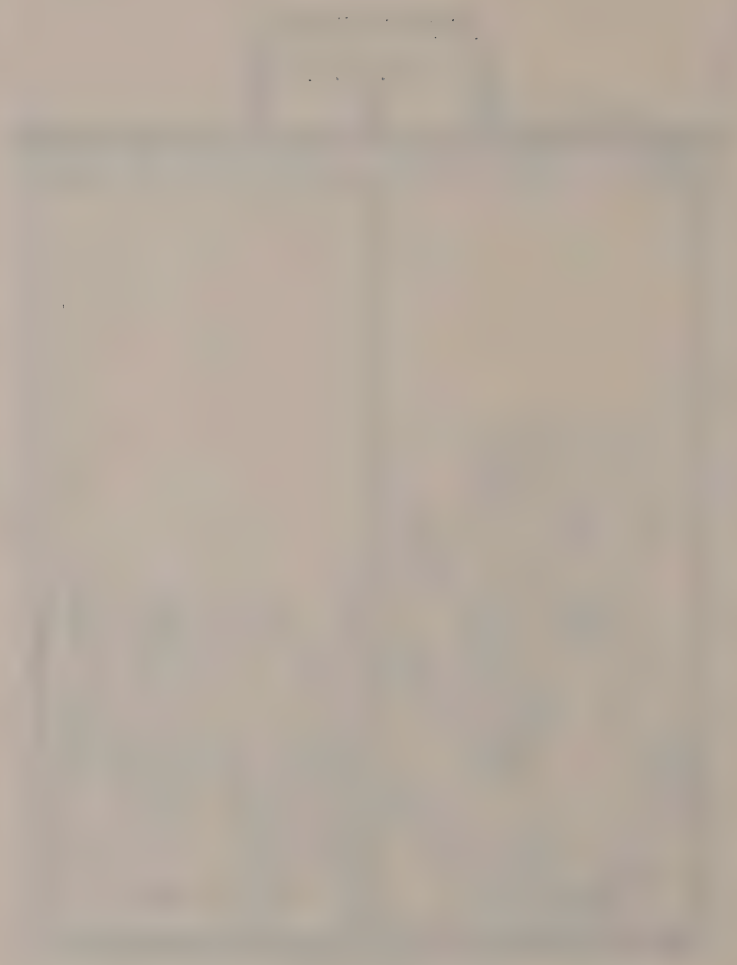


FIGURE 4.3B. VHF RECEIVER CABINET (BOTTOM VIEW)



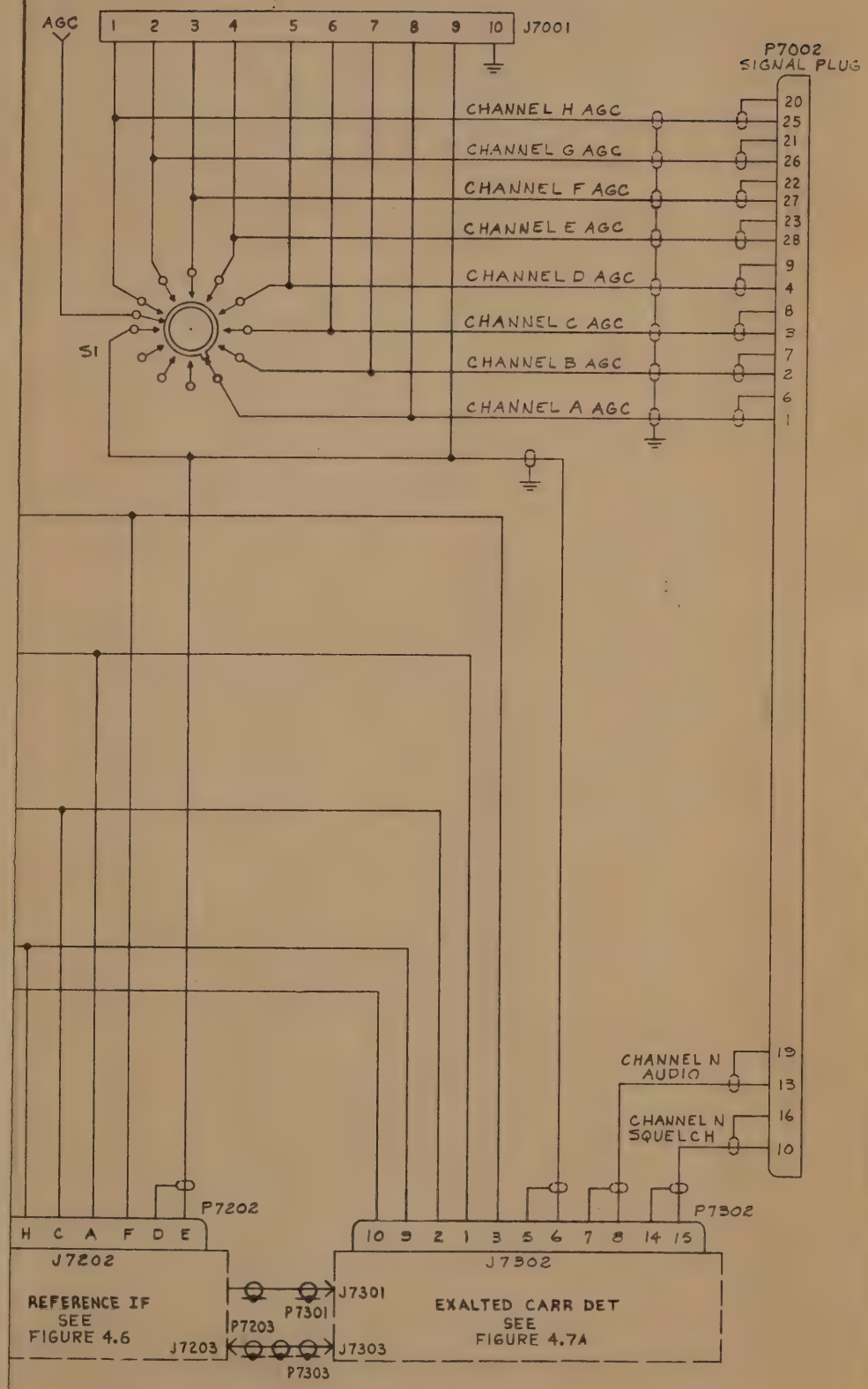


FIGURE 4.3C
VHF RCVR CABINET

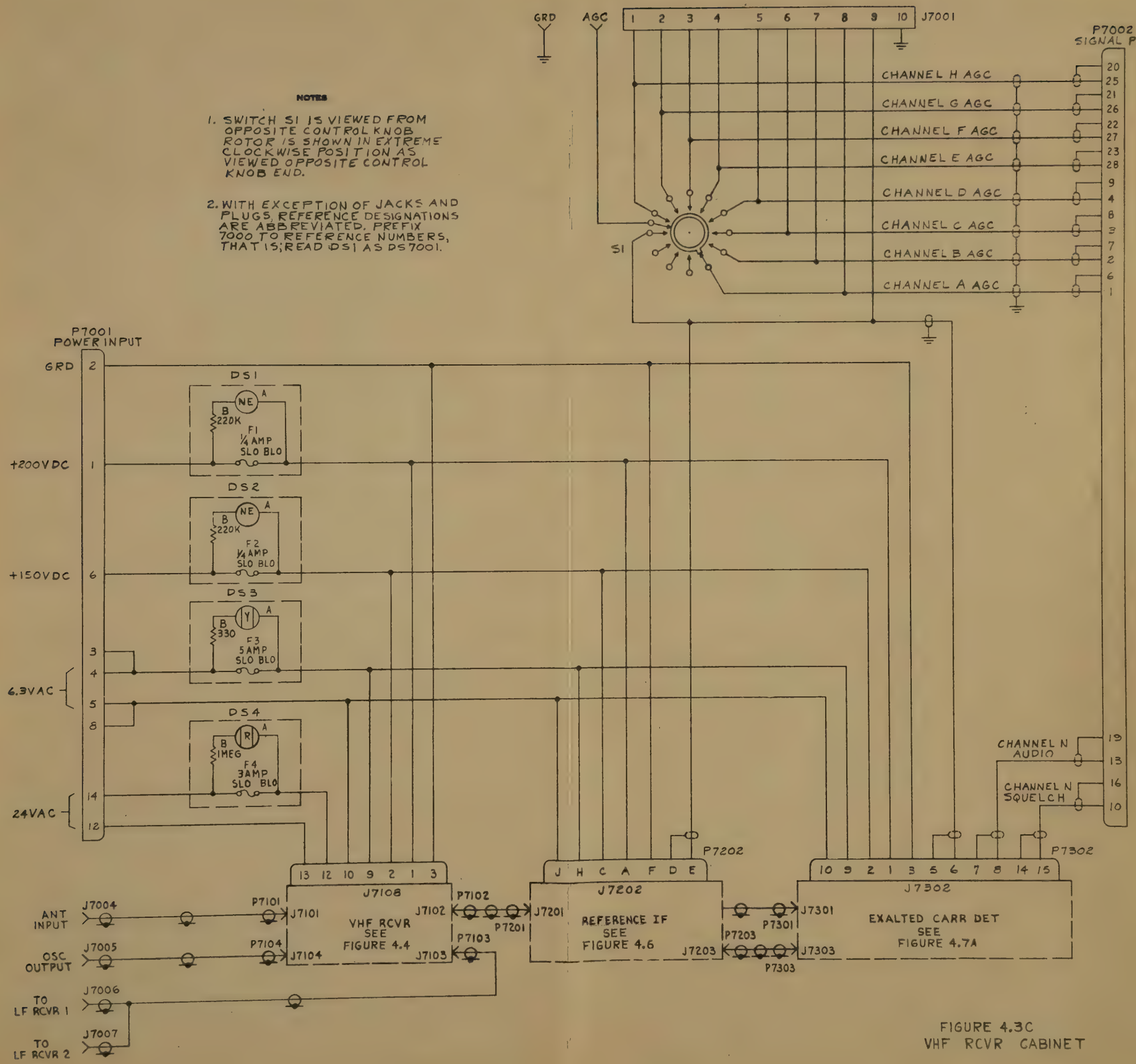


FIGURE 4.3C
VHF RCVR CABINET

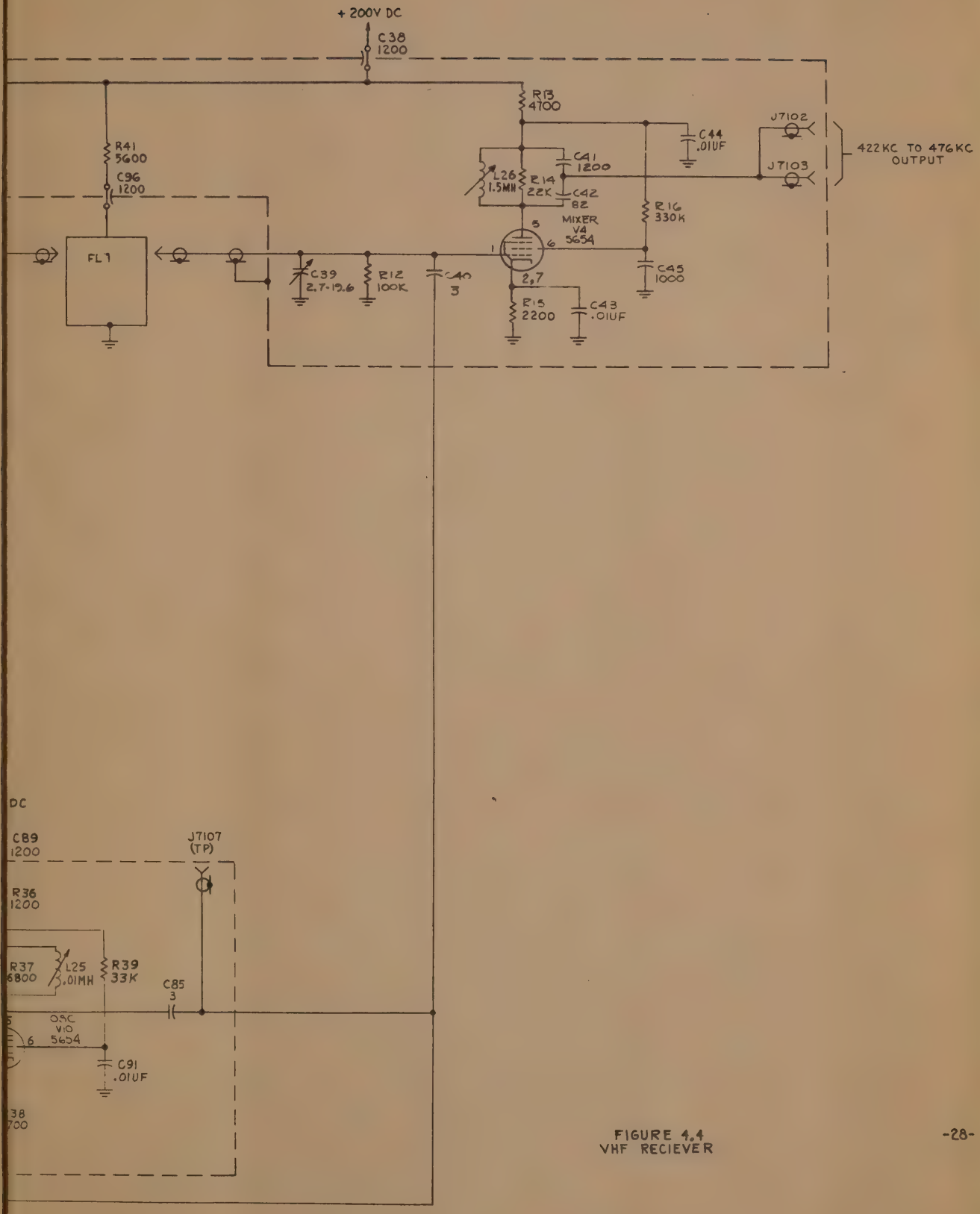
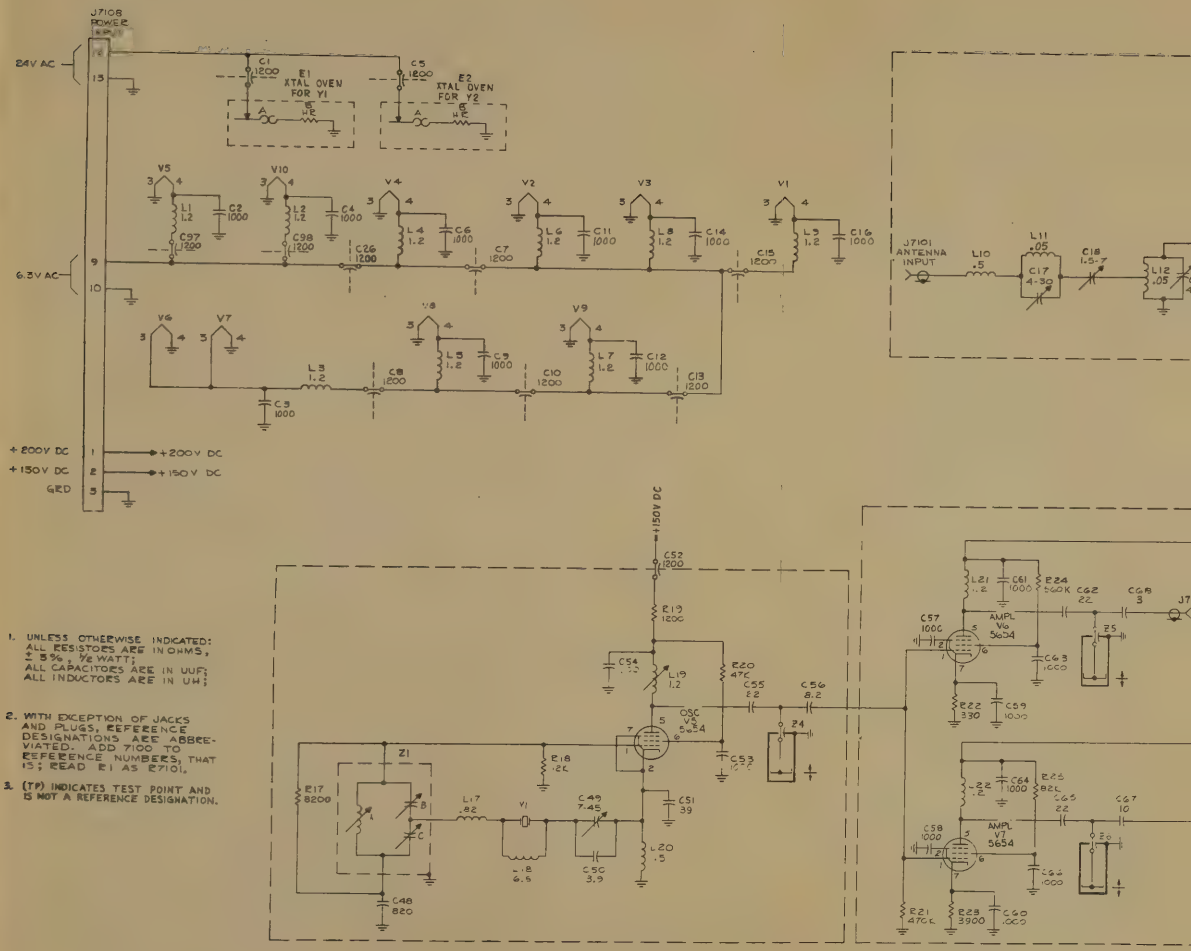


FIGURE 4.4
VHF RECIEVER



1. UNLESS OTHERWISE INDICATED:
   ALL RESISTORS ARE IN OHMS,
   ± 5%, ½ WATT;
   ALL CAPACITORS ARE IN UUF;
   ALL INDUCTORS ARE IN UH;

2. WITH EXCEPTION OF JACKS AND PLUGS, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 7100 TO REFERENCE NUMBERS, THAT IS; READ E1 AS E7101.

3. (TP) INDICATES TEST POINT AND IS NOT A REFERENCE DESIGNATION.

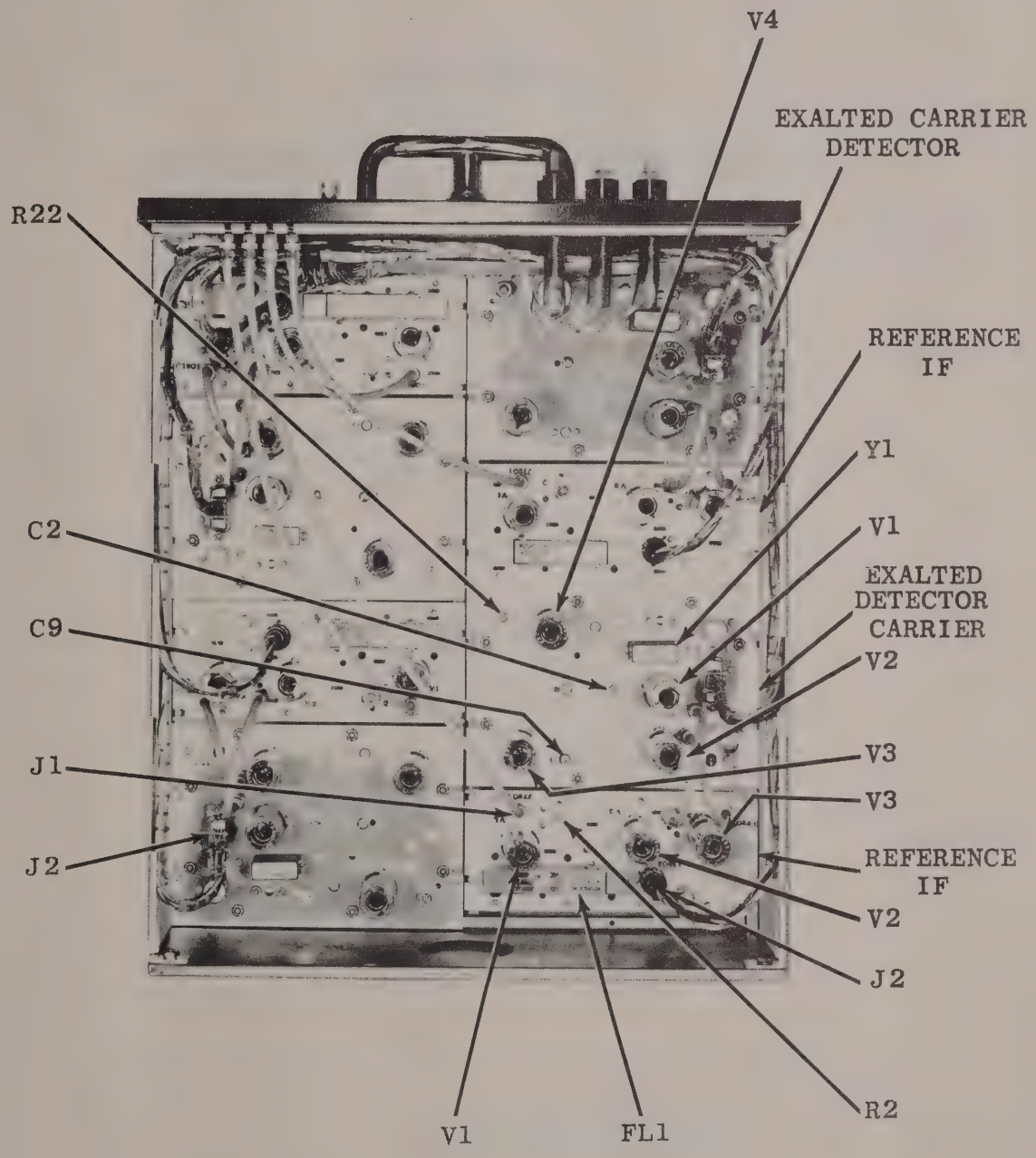


FIGURE 4.5A. LOW FREQUENCY RECEIVER CABINET (TOP VIEW)

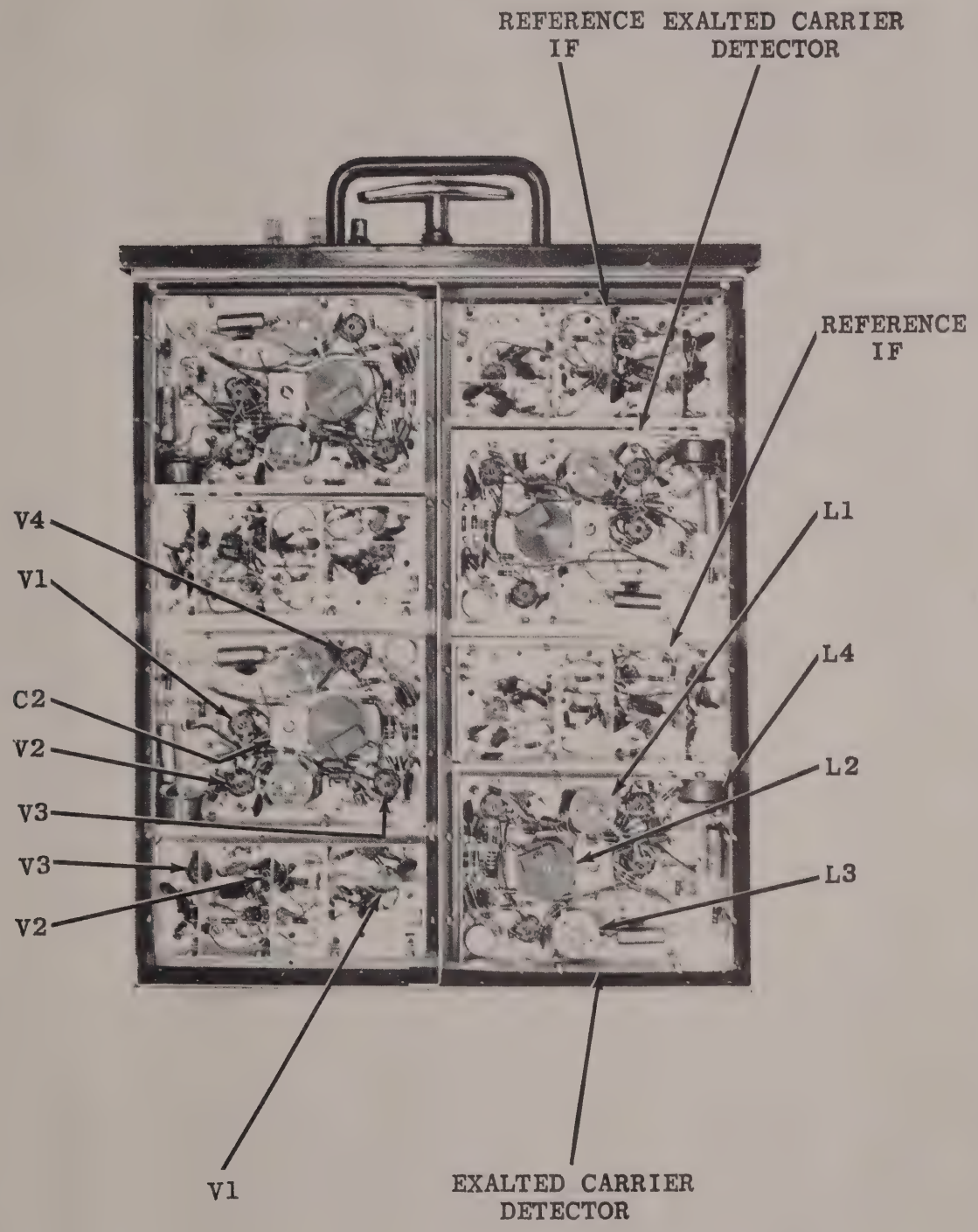
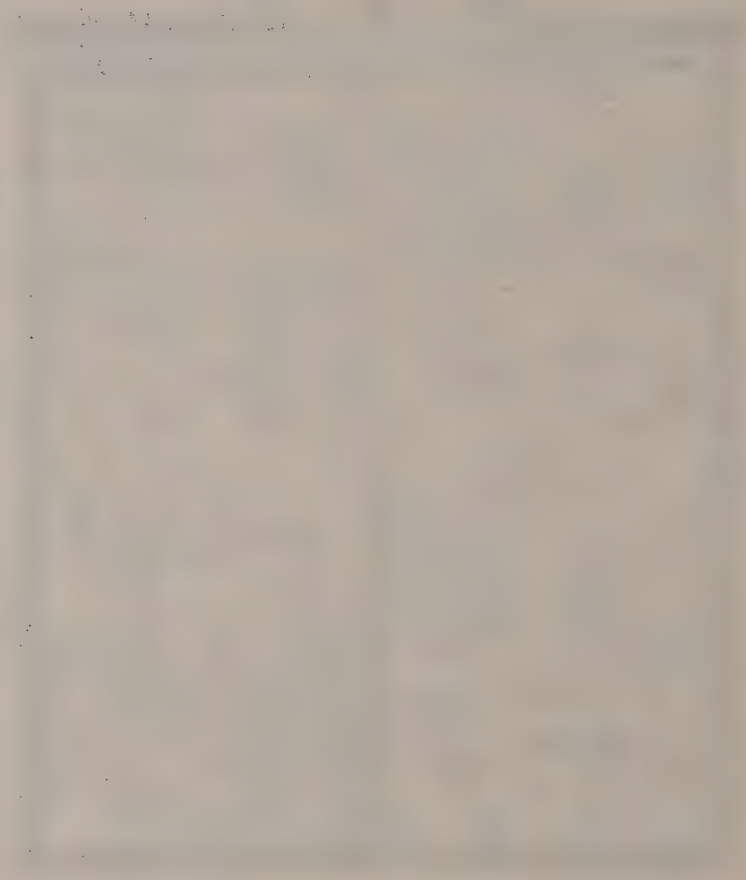


FIGURE 4.5B. LOW FREQUENCY RECEIVER CABINET (BOTTOM VIEW)



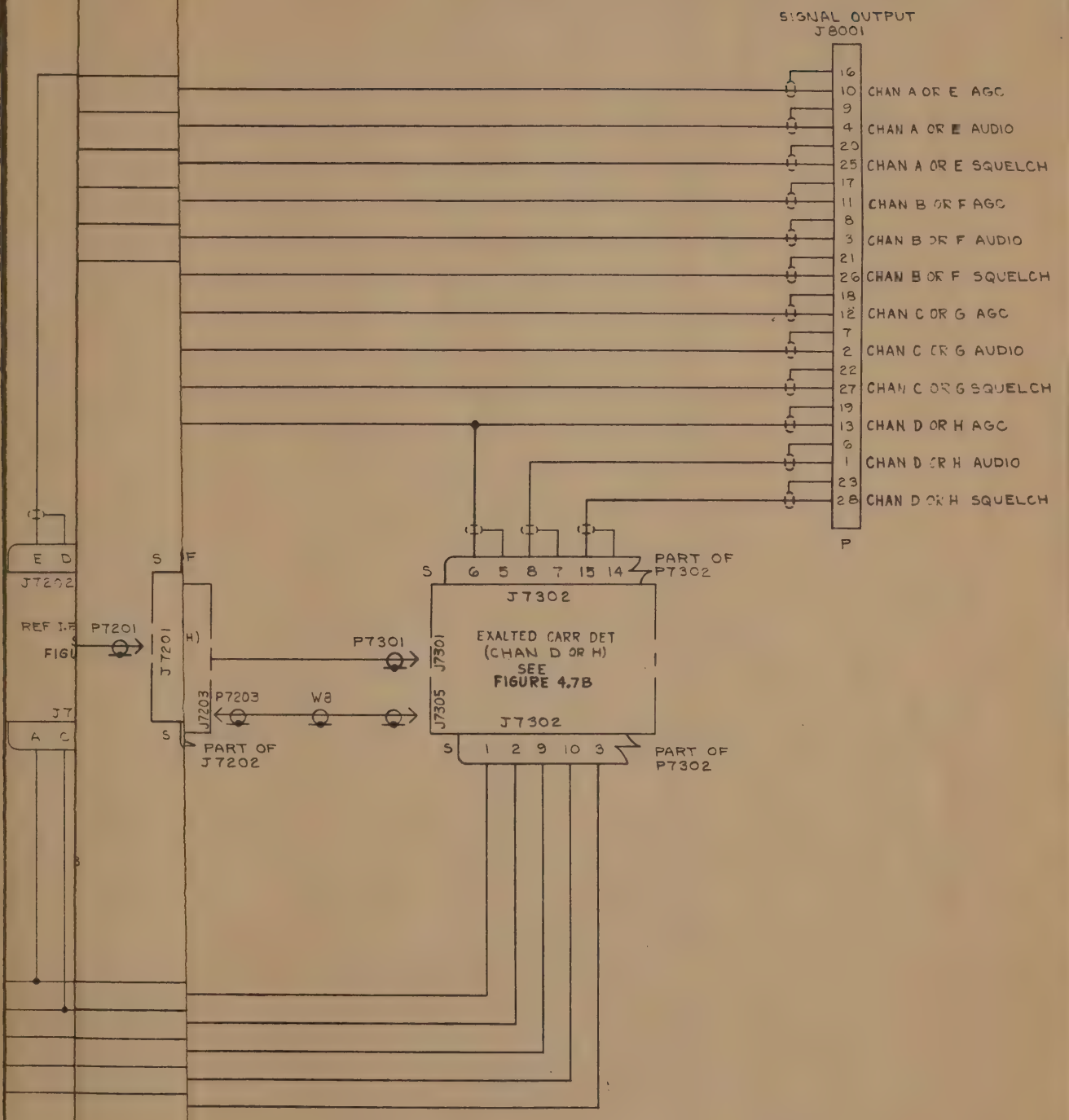


FIGURE 4.5C -31-
LOW FREQUENCY RECEIVER CABINET

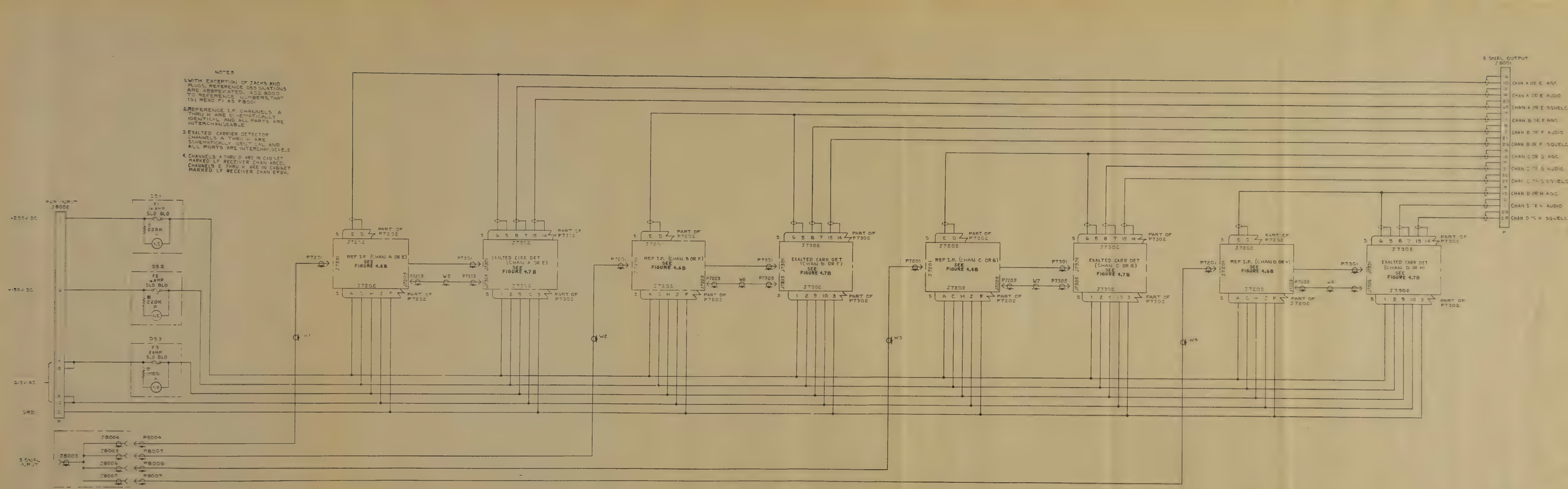
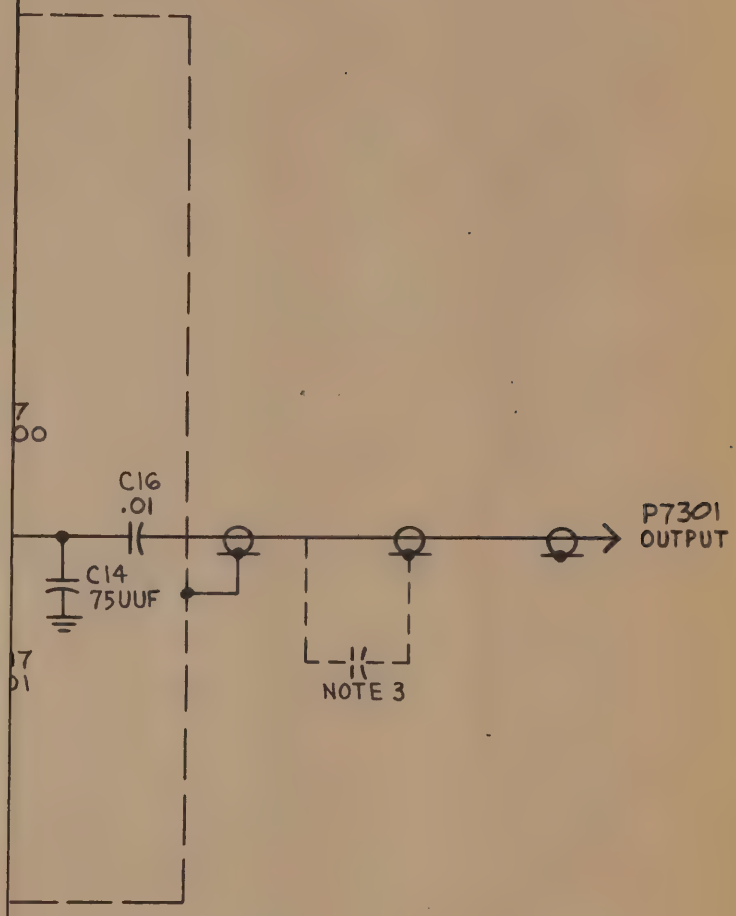


FIGURE 4.5C
LOW FREQUENCY RECEIVER CABI



INDICATED;
ARE IN OHMS, ±5%, 1/2 WATT,
ARE IN UF,
ARE IN MH.

JACKS AND PLUG,
NATIONS ARE
7200 TO REFERENCE
; READ R1 AS

ACITANCE OF THIS
S CRITICAL.
N TO BE 7 ± .25

A THRU H AND N,
LLY IDENTICAL
ON OF VALUES OF

FIGURE 4.6 -32
REFERENCE IF

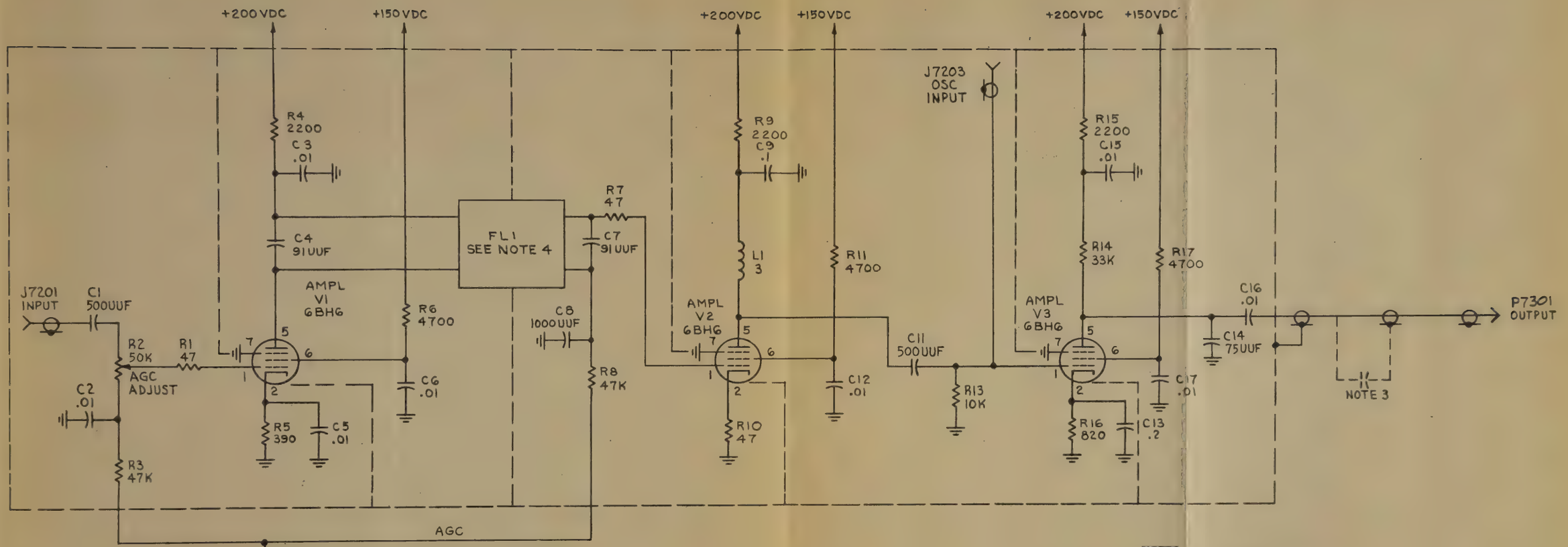


TABLE 1

CHANNEL	FREQUENCY	REFERENCE DESIGNATION OF FL1
N	420 KC	FL1-N
A	426 KC	FL1-A
B	432 KC	FL1-B
C	438 KC	FL1-C
D	444 KC	FL1-D
E	450 KC	FL1-E
F	456 KC	FL1-F
G	462 KC	FL1-G
H	468 KC	FL1-H

NOTES

1. UNLESS OTHERWISE INDICATED; ALL RESISTORS ARE IN OHMS, ±5%, 1/2 WATT, ALL CAPACITORS ARE IN UF, ALL INDUCTORS ARE IN MH.
2. WITH EXCEPTION OF JACKS AND PLUG, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 7200 TO REFERENCE NUMBERS, THAT IS; READ R1 AS R7201.
3. DISTRIBUTED CAPACITANCE OF THIS COAXIAL CABLE IS CRITICAL. SHIELDED PORTION TO BE 7 ± .25 INCHES LONG.
4. NINE L.F. UNITS, A THRU H AND N, ARE SCHEMATICALLY IDENTICAL WITH THE EXCEPTION OF VALUES OF FL1. SEE TABLE 1.

FIGURE 4.6 -32
REFERENCE IF

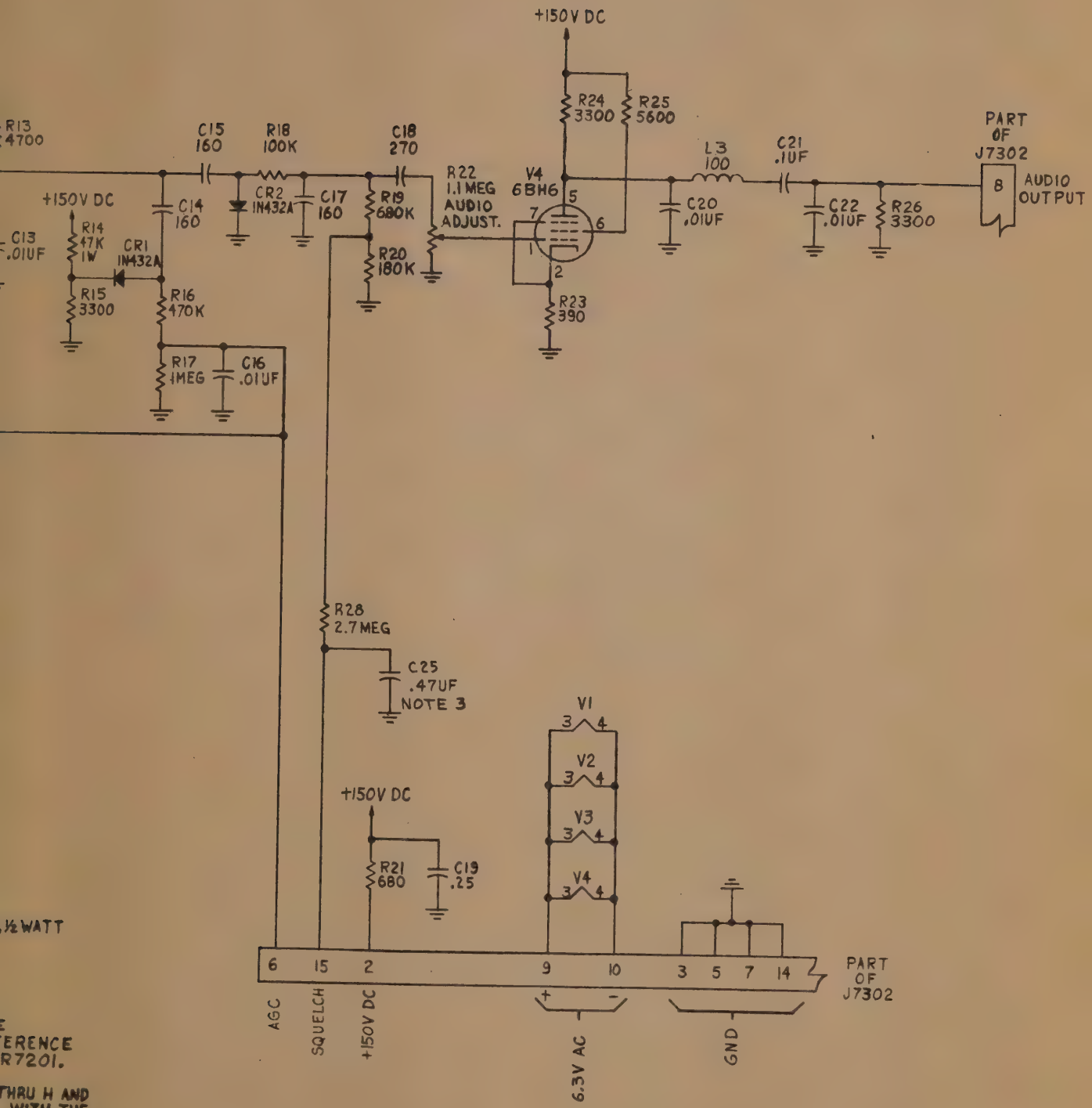
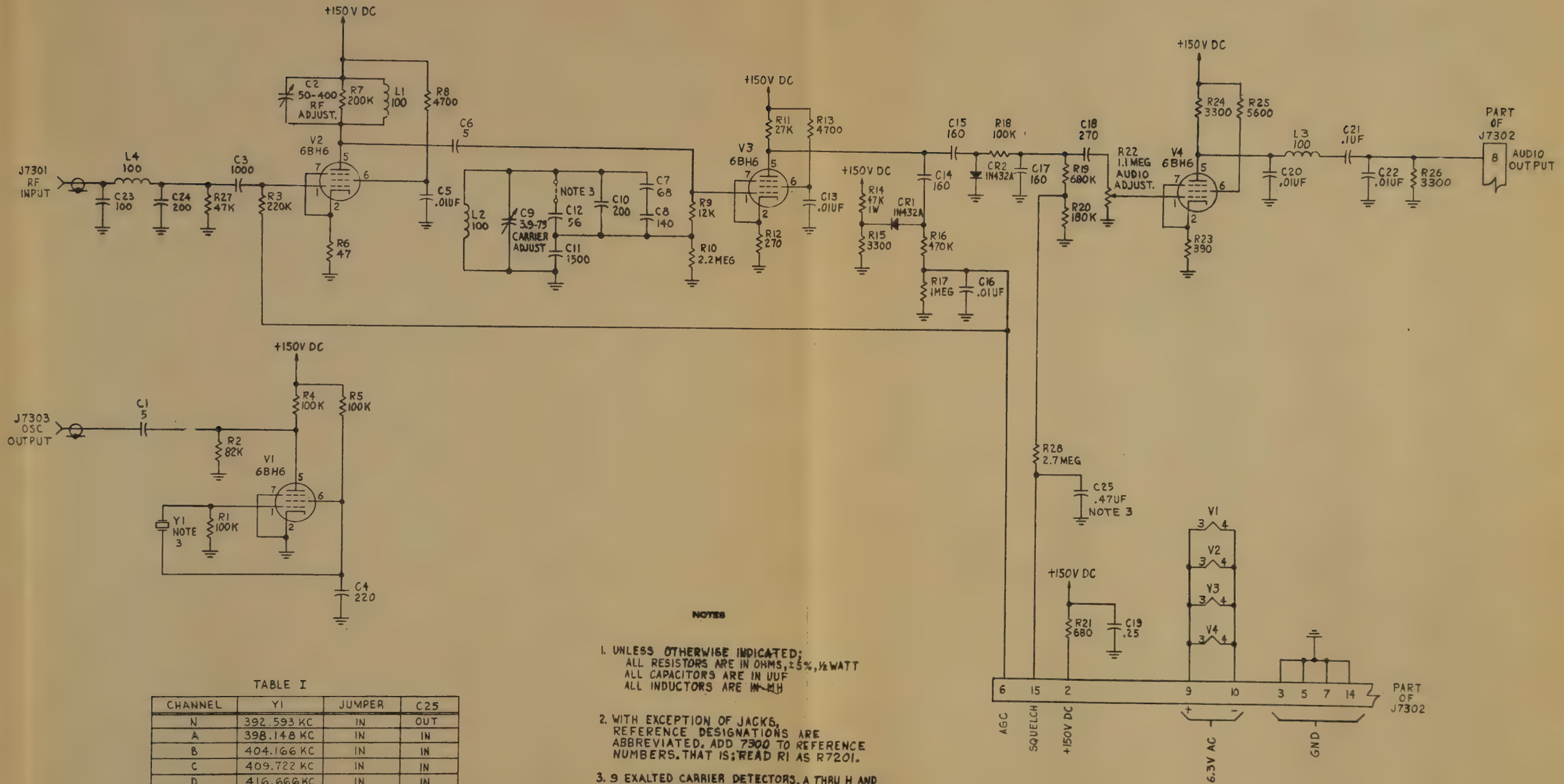


FIGURE 4.7
L.F. RCVR EXALTED CARRIER DETECTER



NOTES

1. UNLESS OTHERWISE INDICATED;
   ALL RESISTORS ARE IN OHMS, ±5%, ½ WATT
   ALL CAPACITORS ARE IN UUF
   ALL INDUCTORS ARE IN MH

2. WITH EXCEPTION OF JACKS, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 7300 TO REFERENCE NUMBERS. THAT IS; READ R1 AS R7201.

3. 9 EXALTED CARRIER DETECTORS, A THRU H AND N, ARE SCHEMATICALLY IDENTICAL WITH THE EXCEPTION OF THE VALUE OF Y1, CONNECTION OF JUMPER, INDICATED ~~- - -~~ AND C25, SEE TABLE I BELOW.

TABLE I

CHANNEL	Y1	JUMPER	C25
N	392.593 KC	IN	OUT
A	398.148 KC	IN	IN
B	404.166 KC	IN	IN
C	409.722 KC	IN	IN
D	416.666 KC	IN	IN
E	481.944 KC	OUT	IN
F	487.500 KC	OUT	IN
G	494.444 KC	OUT	IN
H	498.611 KC	OUT	IN

FIGURE 4.7
L.F. RCVR EXALTED CARRIER DETECTER

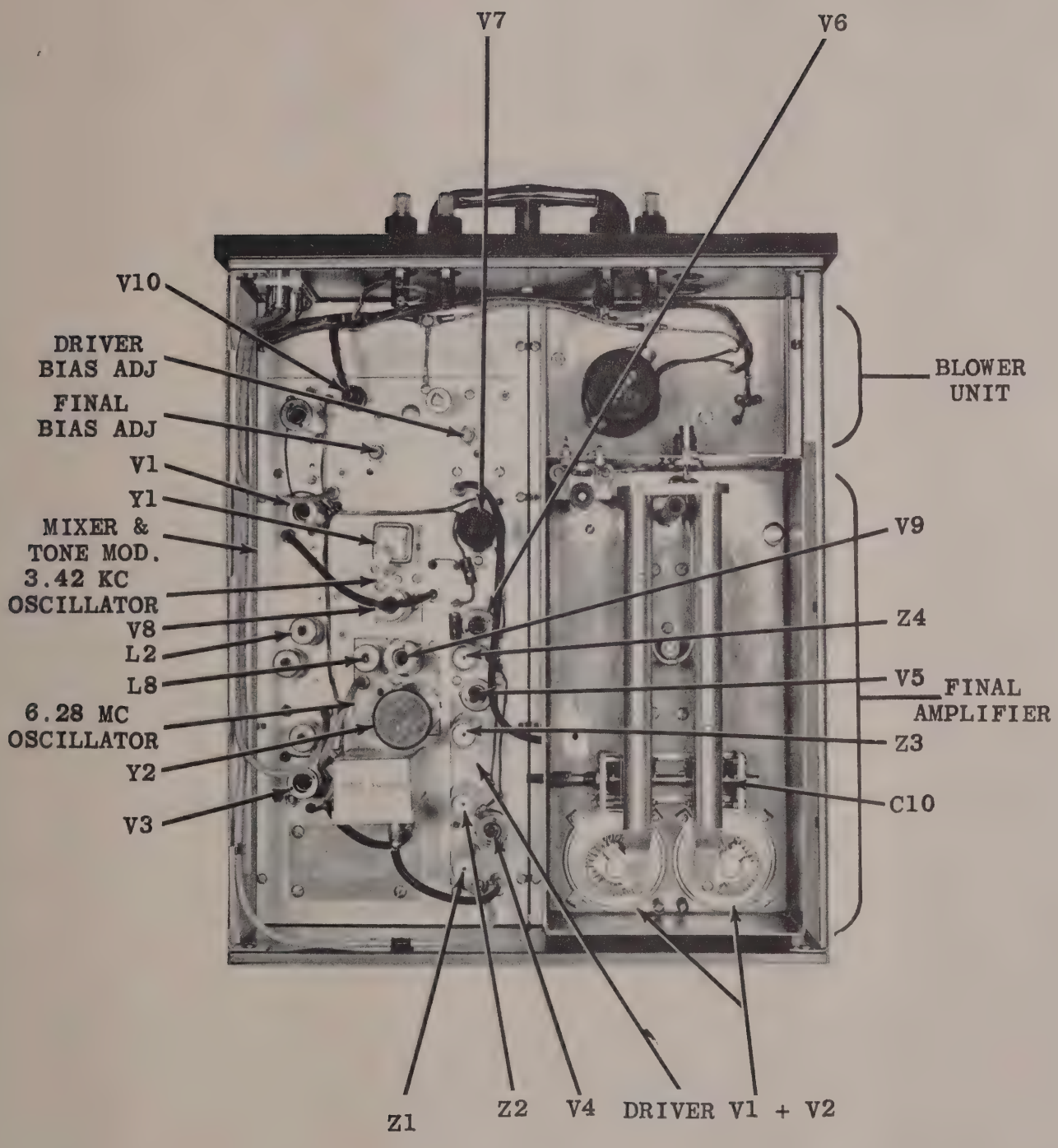


FIGURE 4.8A. TRANSMITTER CABINET (TOP VIEW)

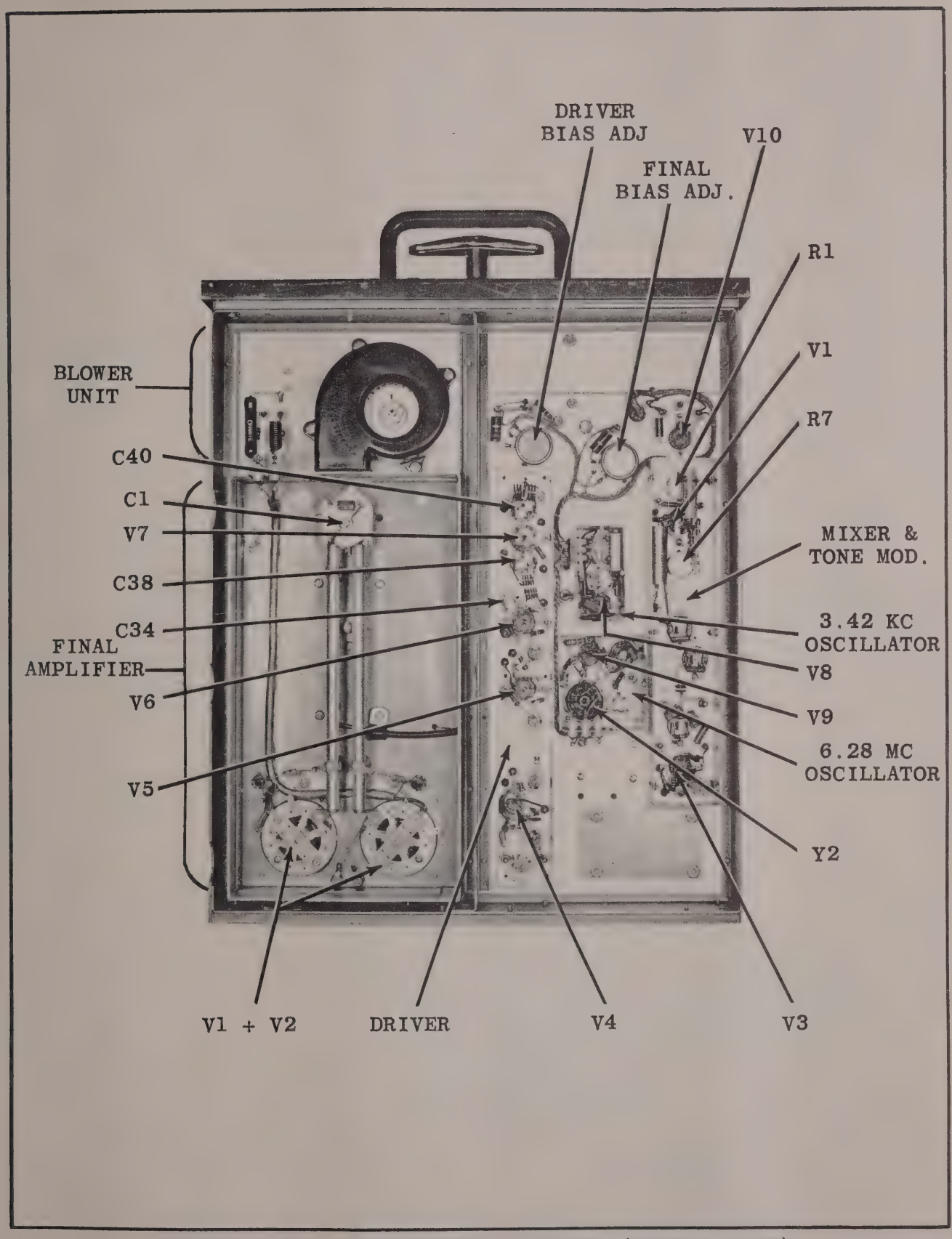


FIGURE 4.8B. TRANSMITTER CABINET (BOTTOM VIEW)

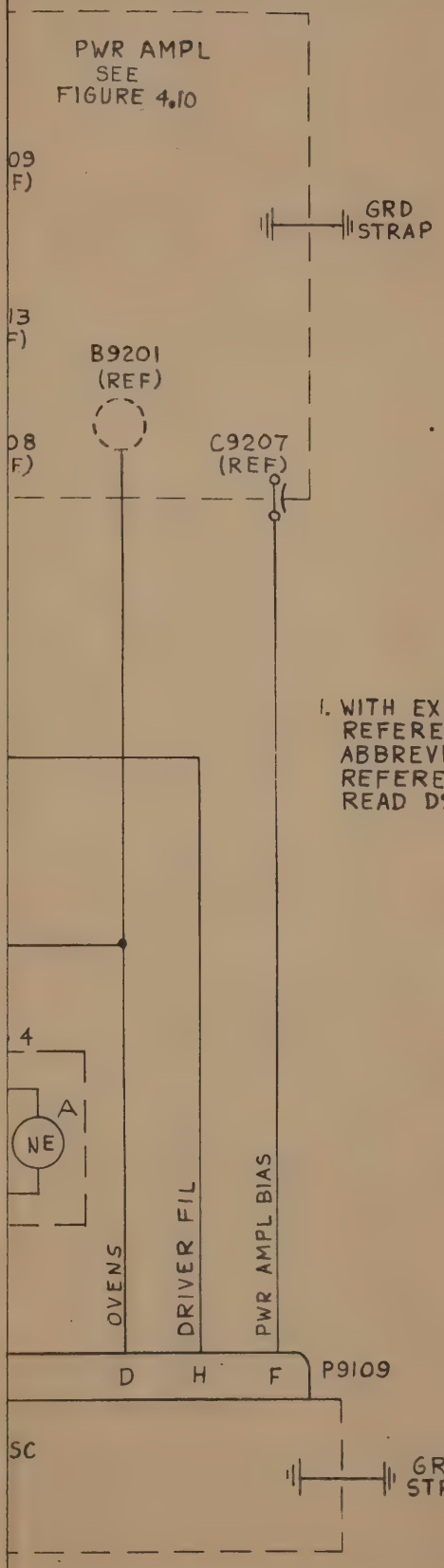
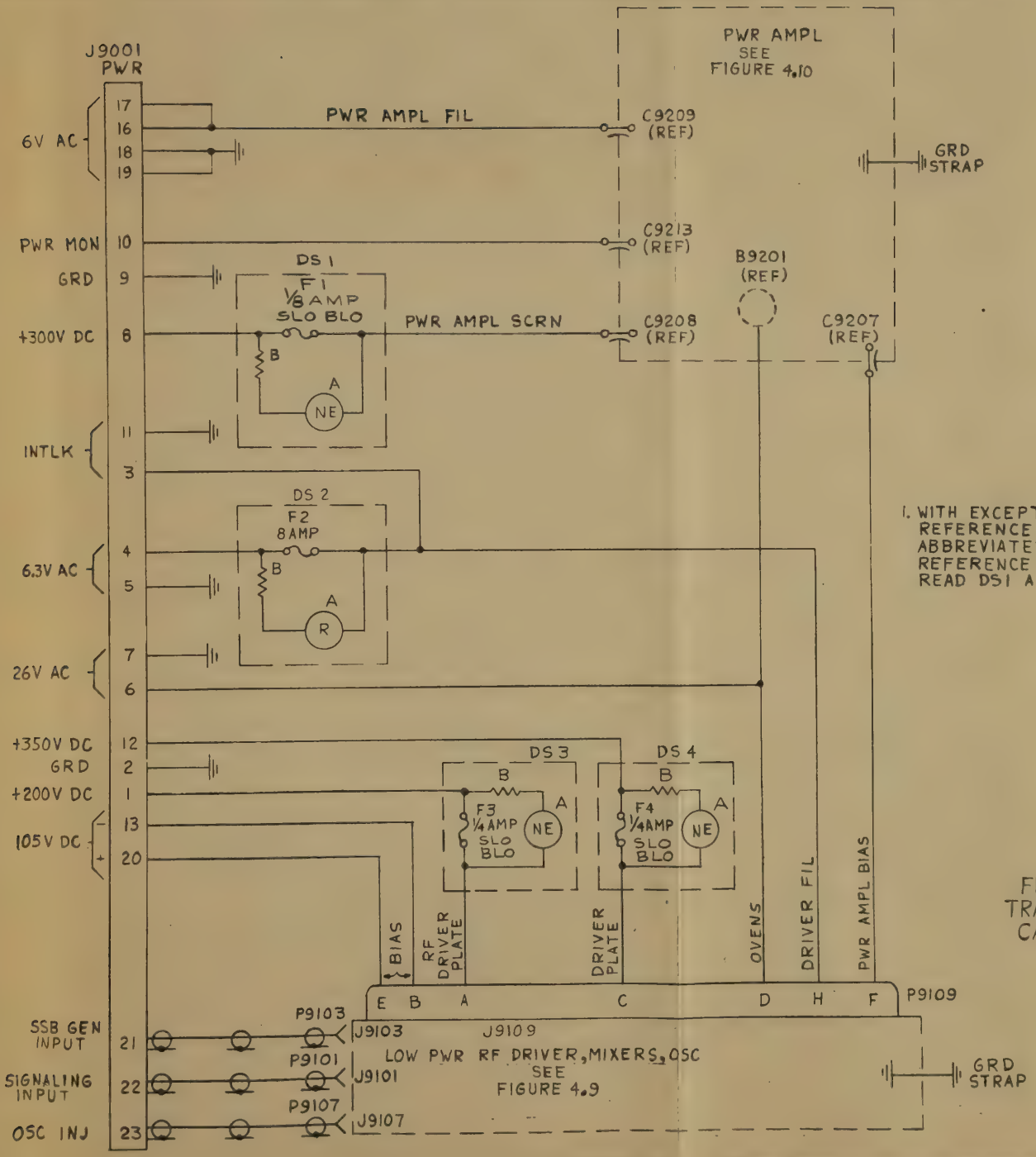


FIGURE 4.8C
TRANSMITTER
CABINET



NOTES

1. WITH EXCEPTION OF JACKS AND PLUGS, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 9000 TO REFERENCE NUMBERS, THAT IS; READ DS1 AS DS 9001.

FIGURE 4.8C
TRANSMITTER
CABINET

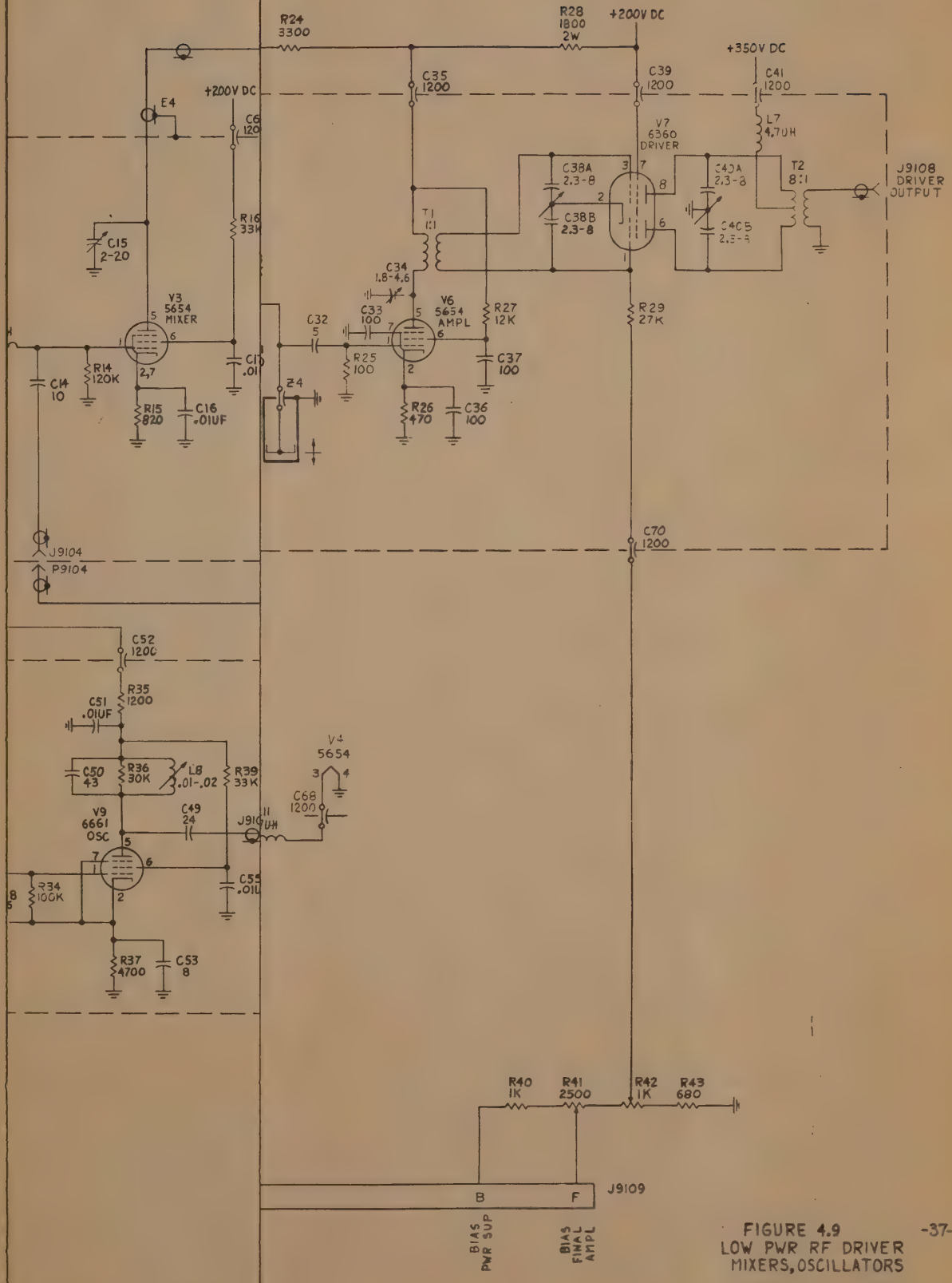
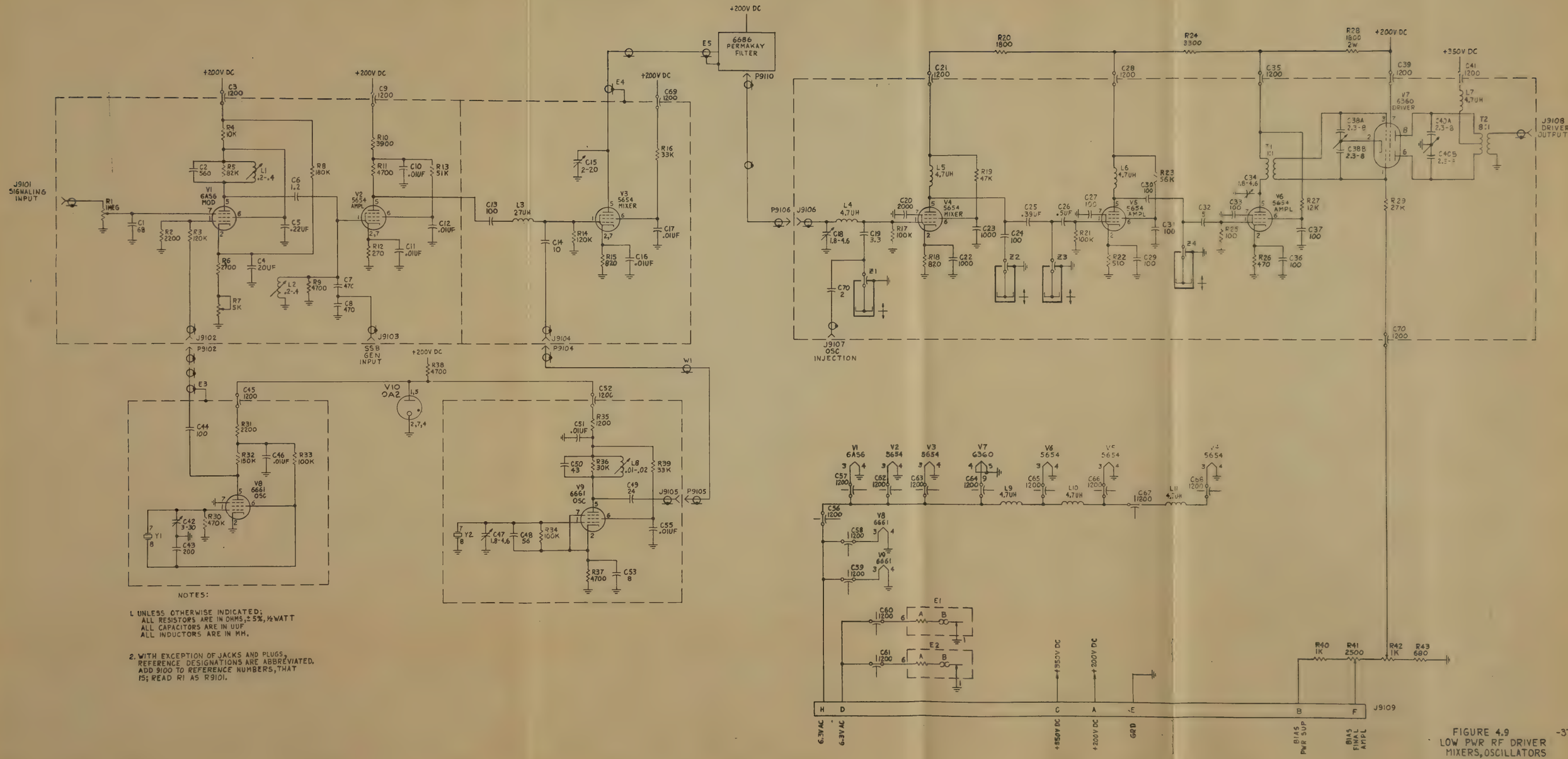


FIGURE 4.9
LOW PWR RF DRIVER
MIXERS, OSCILLATORS

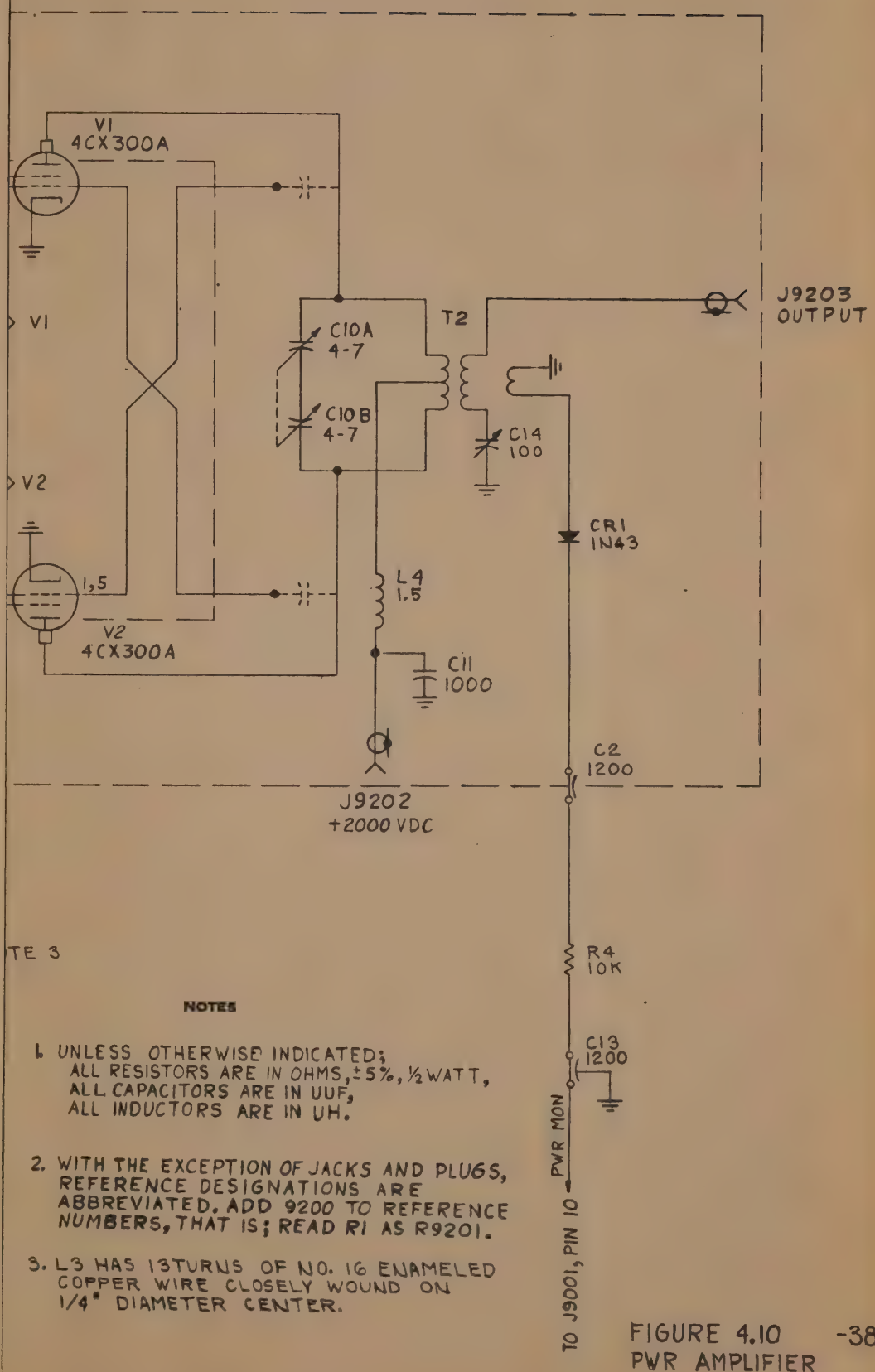


NOTES:

1. UNLESS OTHERWISE INDICATED;
   ALL RESISTORS ARE IN OHMS, ±5%, ½WATT
   ALL CAPACITORS ARE IN UUF
   ALL INDUCTORS ARE IN MH.

2. WITH EXCEPTION OF JACKS AND PLUGS, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 9100 TO REFERENCE NUMBERS, THAT IS; READ R1 AS R9101.

FIGURE 4.9
LOW PWR RF DRIVER MIXERS, OSCILLATORS



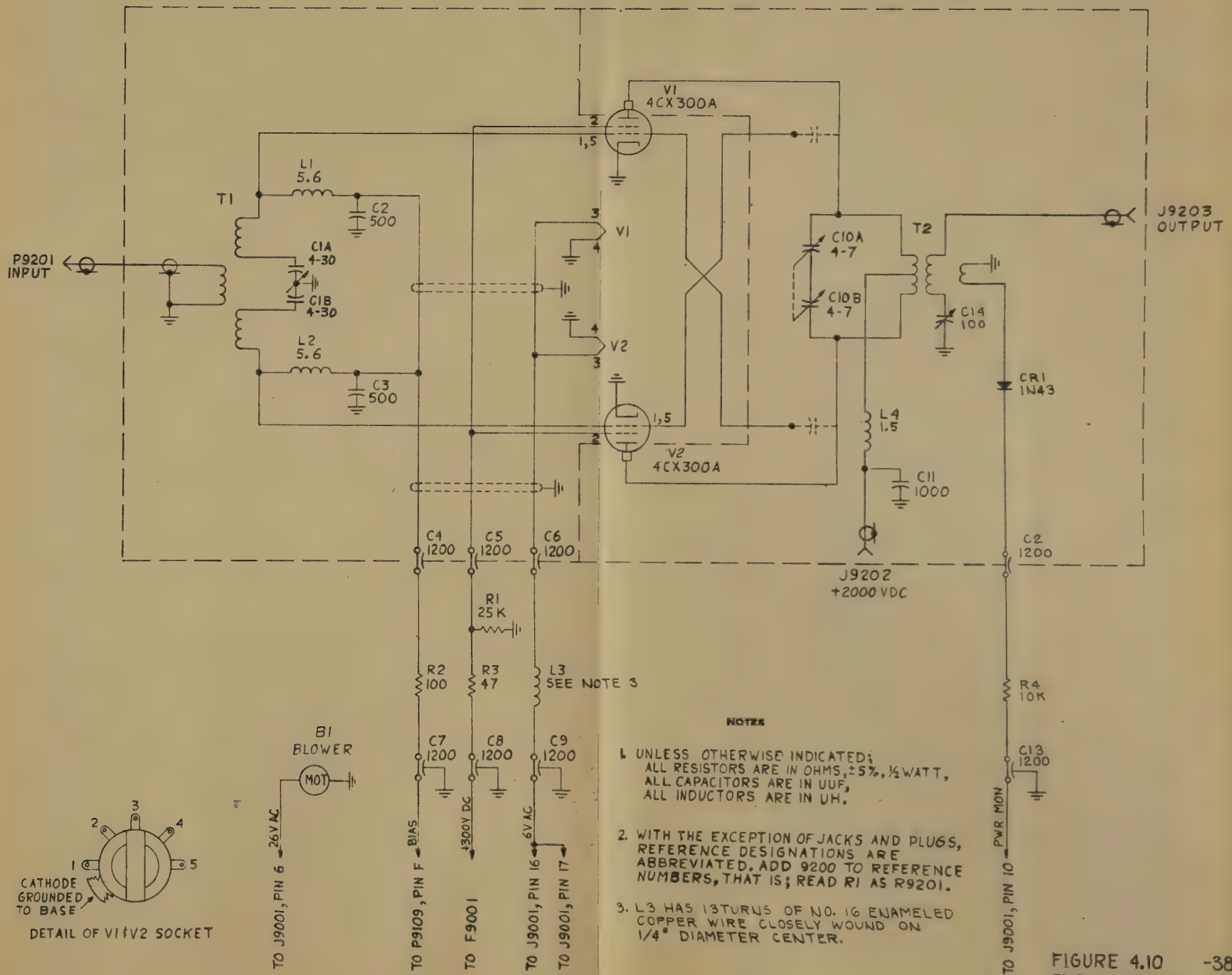
NOTES

1. UNLESS OTHERWISE INDICATED;
   ALL RESISTORS ARE IN OHMS, ±5%, ½ WATT,
   ALL CAPACITORS ARE IN UUF,
   ALL INDUCTORS ARE IN UH.

2. WITH THE EXCEPTION OF JACKS AND PLUGS, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 9200 TO REFERENCE NUMBERS, THAT IS; READ R1 AS R9201.

3. L3 HAS 13 TURNS OF NO. 16 ENAMELED COPPER WIRE CLOSELY WOUND ON 1/4" DIAMETER CENTER.

FIGURE 4.10 PWR AMPLIFIER



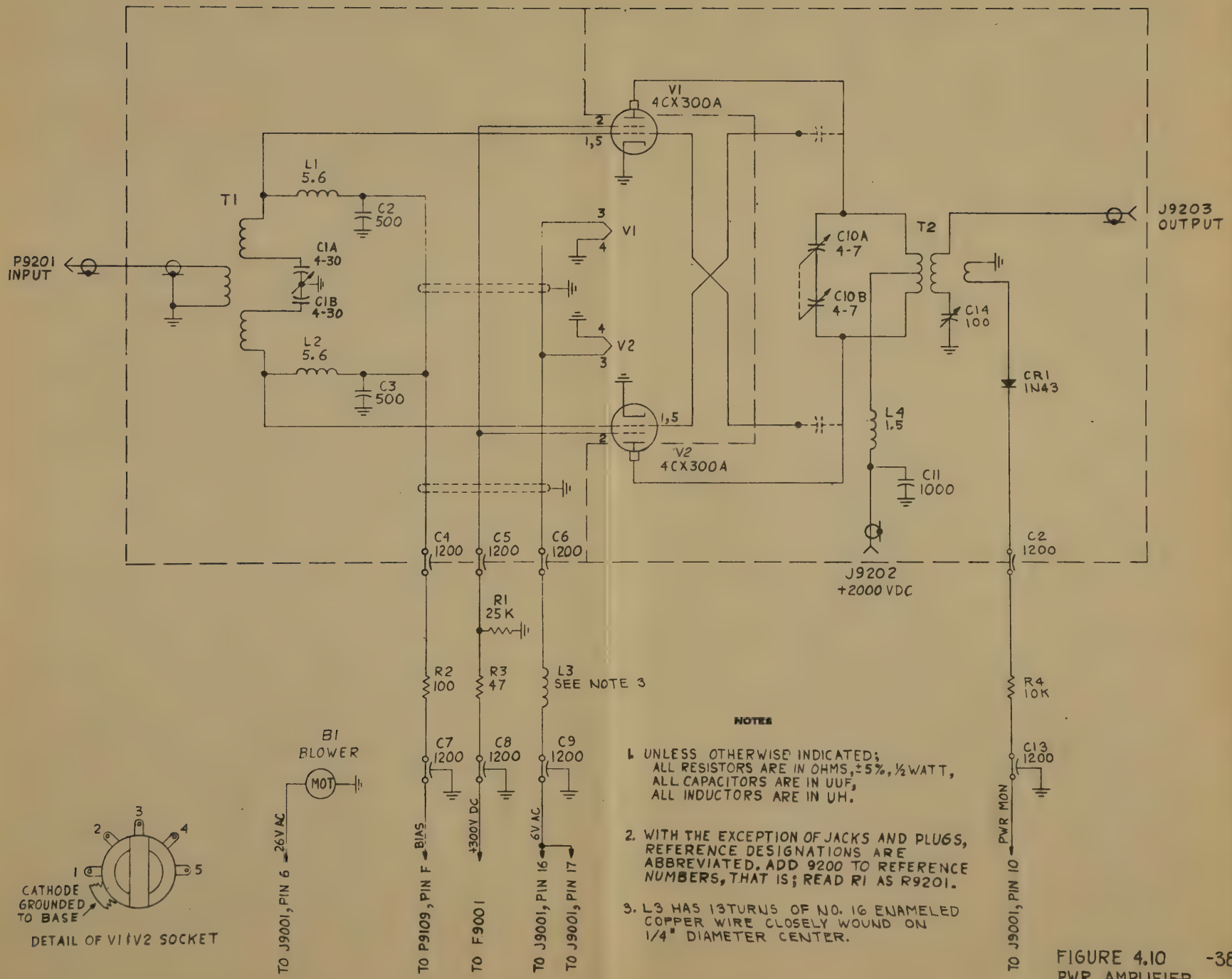
NOTES

1. UNLESS OTHERWISE INDICATED;
   ALL RESISTORS ARE IN OHMS, ±5%, ½WATT,
   ALL CAPACITORS ARE IN UUF,
   ALL INDUCTORS ARE IN UH.

2. WITH THE EXCEPTION OF JACKS AND PLUGS, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 9200 TO REFERENCE NUMBERS, THAT IS; READ R1 AS R9201.

3. L3 HAS 13TURNS OF NO. 16 ENAMELED COPPER WIRE CLOSELY WOUND ON 1/4" DIAMETER CENTER.

FIGURE 4.10
PWR AMPLIFIER



NOTES

1. UNLESS OTHERWISE INDICATED; ALL RESISTORS ARE IN OHMS, ±5%, ½ WATT, ALL CAPACITORS ARE IN UUF, ALL INDUCTORS ARE IN UH.
2. WITH THE EXCEPTION OF JACKS AND PLUGS, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 9200 TO REFERENCE NUMBERS, THAT IS; READ R1 AS R9201.
3. L3 HAS 13 TURNS OF NO. 16 ENAMELED COPPER WIRE CLOSELY WOUND ON 1/4" DIAMETER CENTER.

FIGURE 4.10 PWR AMPLIFIER

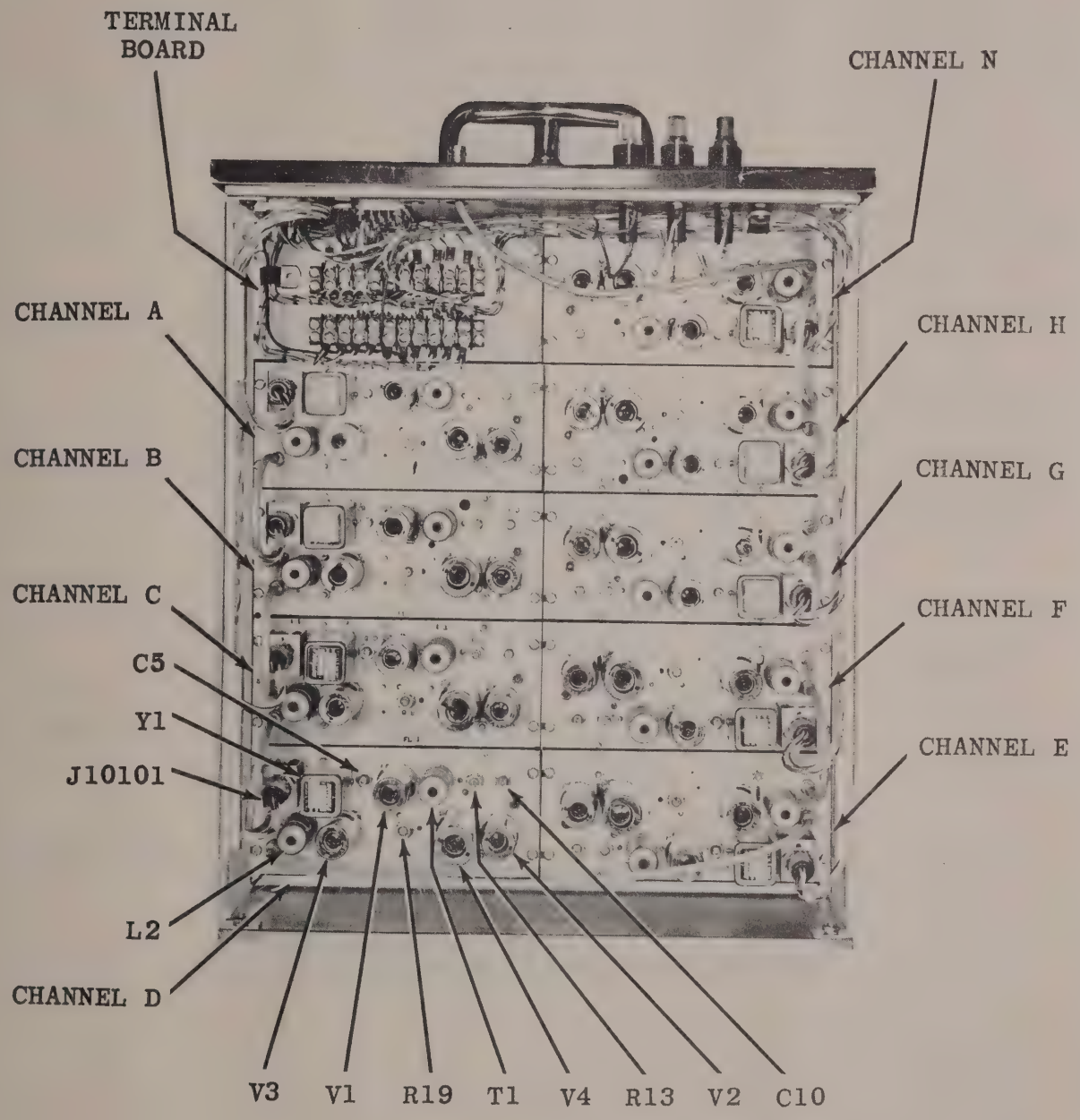


FIGURE 4.11A. SINGLE SIDEBAND GENERATOR CABINET (TOP VIEW)

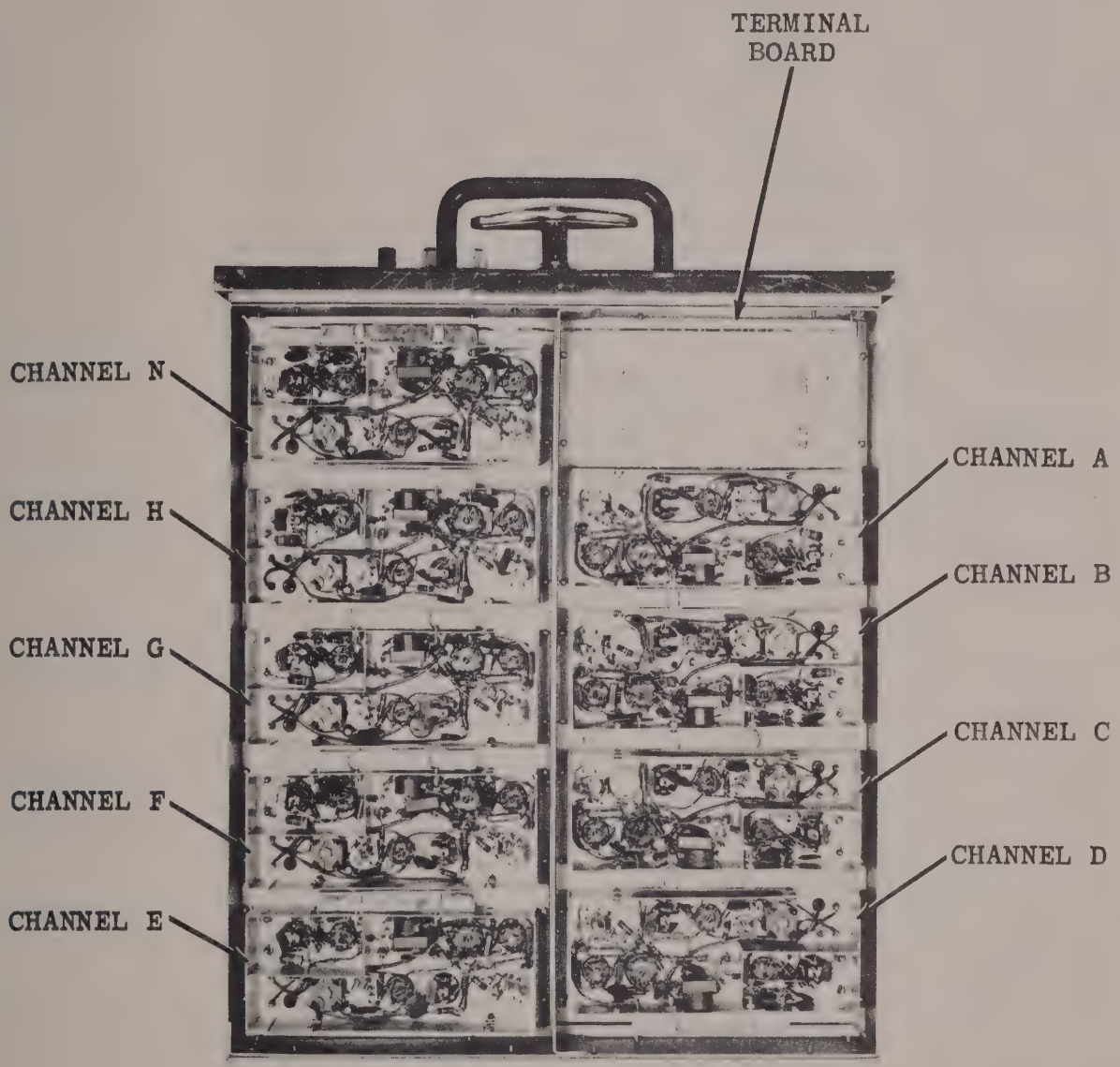


FIGURE 4.11B. SINGLE SIDEBAND GENERATOR CABINET (BOTTOM VIEW)

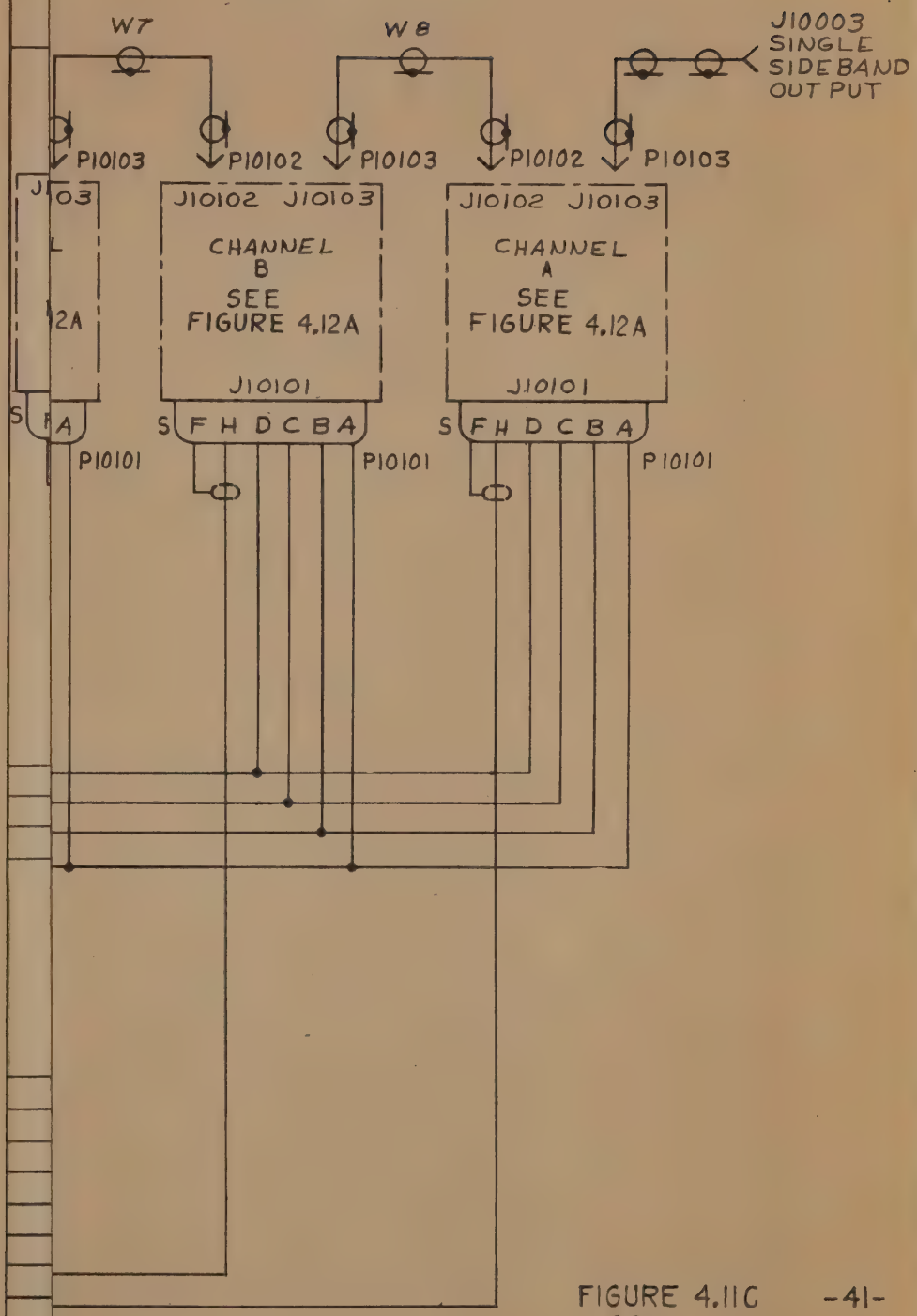


FIGURE 4.11C
SSB
GENERATOR
CABINET

NOTES

1. WITH EXCEPTION OF JACKS AND PLUGS, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 10000 TO REFERENCE NUMBERS, THAT IS; READ C1 AS C10001.

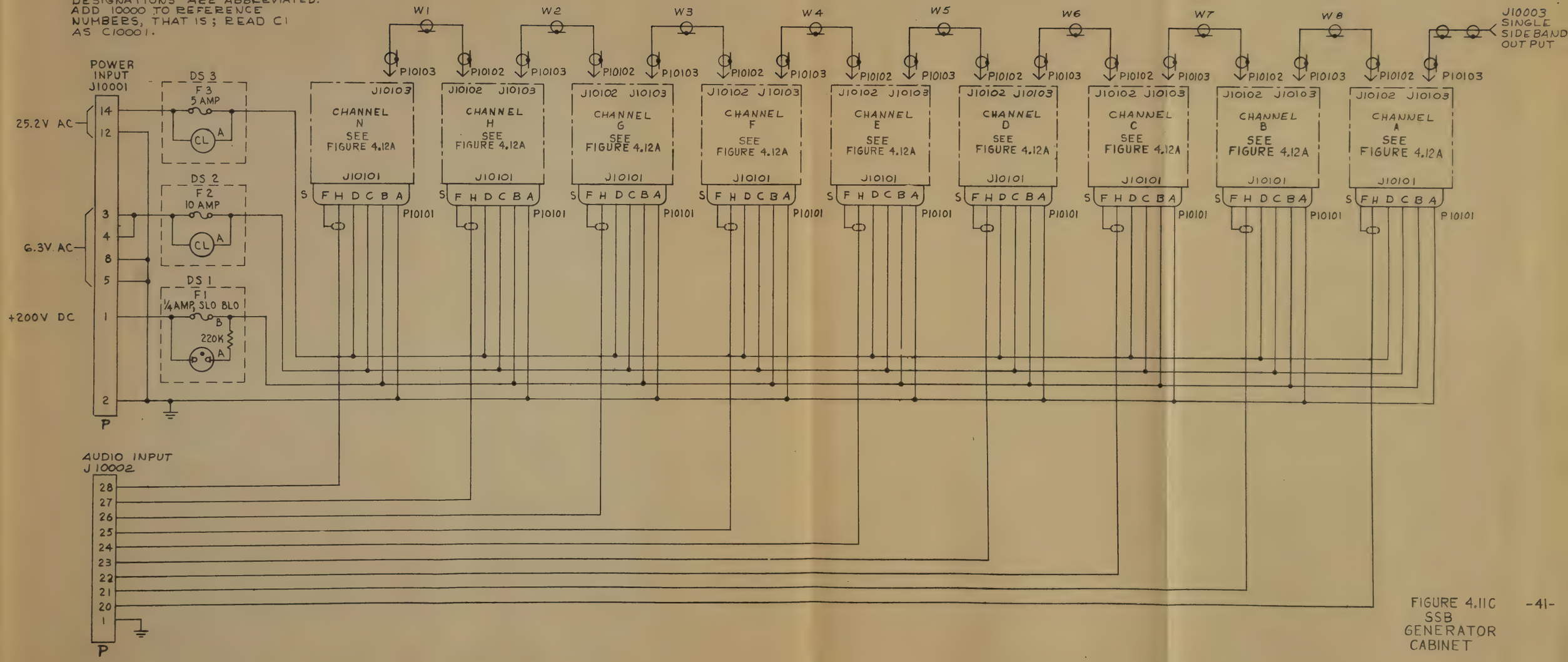
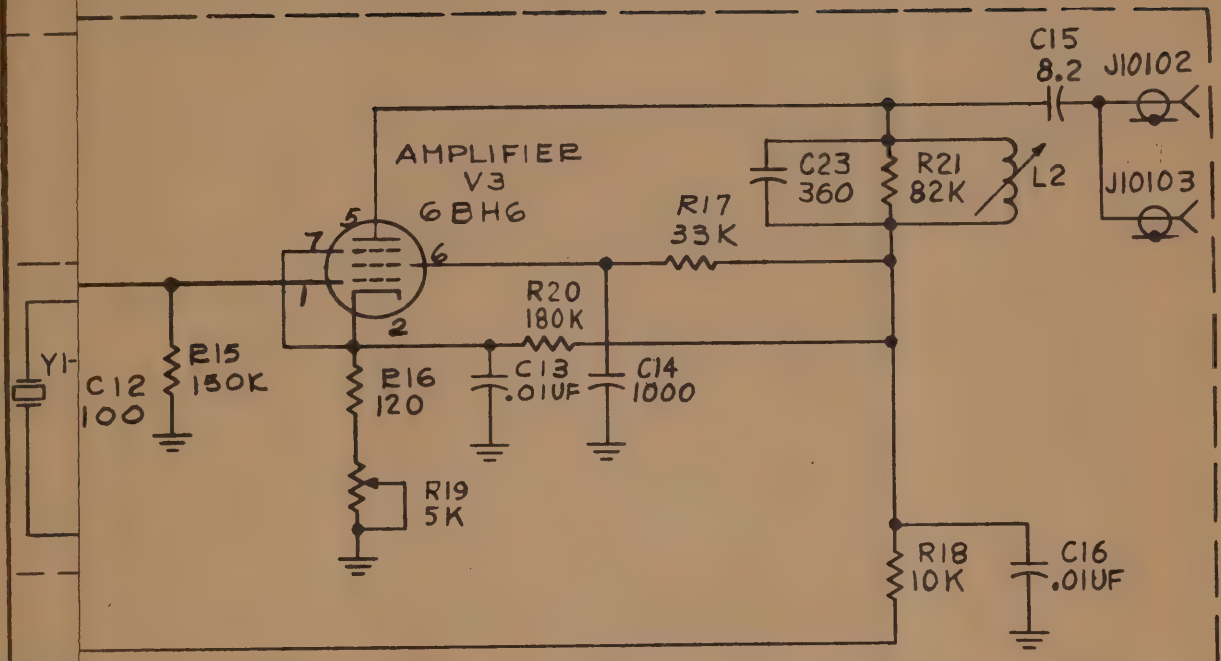


FIGURE 4.11C
SSB
GENERATOR
CABINET



NOTES

1. UNLESS OTHERWISE INDICATED; ALL RESISTORS ARE IN OHMS, ALL CAPACITORS ARE IN UUF.

2. WITH THE EXCEPTION OF JACKS, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 10100 TO REFERENCE NUMBERS, THAT IS; READ R1 AS R10101.

*3. NINE SINGLE SIDEBAND UNITS A THRU H AND N ARE SCHEMATICALY IDENTICAL WITH THE EXCEPTION OF VALUES OF Y1 AND FL1; SEE TABLE I.

4. (TP) INDICATES TEST POINT AND IS NOT A REFERENCE DESIGNATION.

SINGLE SIDEBAND GENERATOR
CHANNEL *

FIGURE 4.12
SINGLE-SIDEBAND GENERATOR

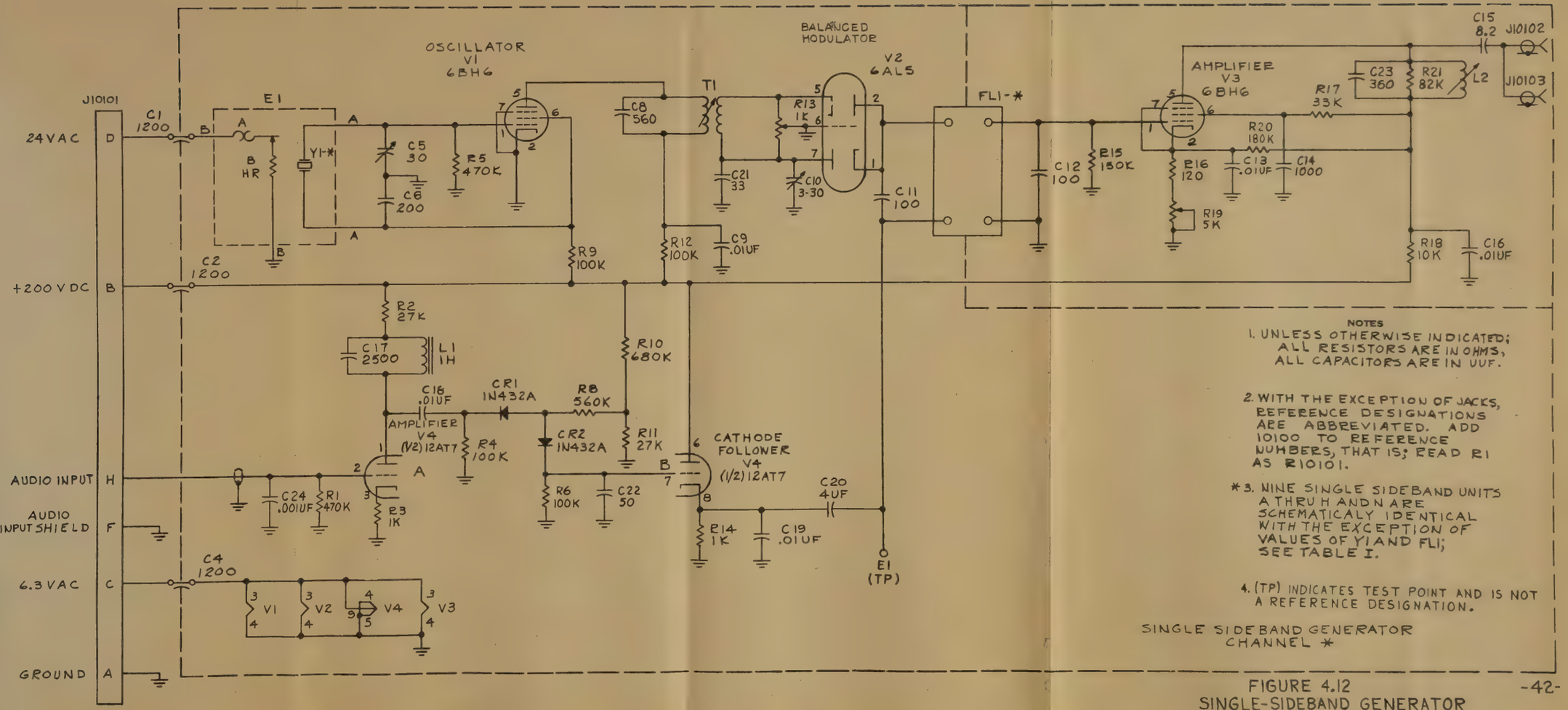


TABLE I

CHANNEL	FREQ	REFERENCE DESIGNATION OF	
		FL1	Y1
A	420 KC	FL1-A	Y1-A
B	426 KC	FL1-B	Y1-B
C	432 KC	FL1-C	Y1-C
D	438 KC	FL1-D	Y1-D
E	444 KC	FL1-E	Y1-E
F	450 KC	FL1-F	Y1-F
G	456 KC	FL1-G	Y1-G
H	462 KC	FL1-H	Y1-H
N	468 KC	FL1-N	Y1-N

NOTES

1. UNLESS OTHERWISE INDICATED; ALL RESISTORS ARE IN OHMS, ALL CAPACITORS ARE IN UUF.

2. WITH THE EXCEPTION OF JACKS, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 10100 TO REFERENCE NUMBERS, THAT IS; READ R1 AS R10101.

*3. NINE SINGLE SIDEBAND UNITS A THRU H AND N ARE SCHEMATICALY IDENTICAL WITH THE EXCEPTION OF VALUES OF Y1 AND FL1; SEE TABLE I.

4. (TP) INDICATES TEST POINT AND IS NOT A REFERENCE DESIGNATION.

SINGLE SIDEBAND GENERATOR
CHANNEL *

FIGURE 4.12
SINGLE-SIDEBAND GENERATOR

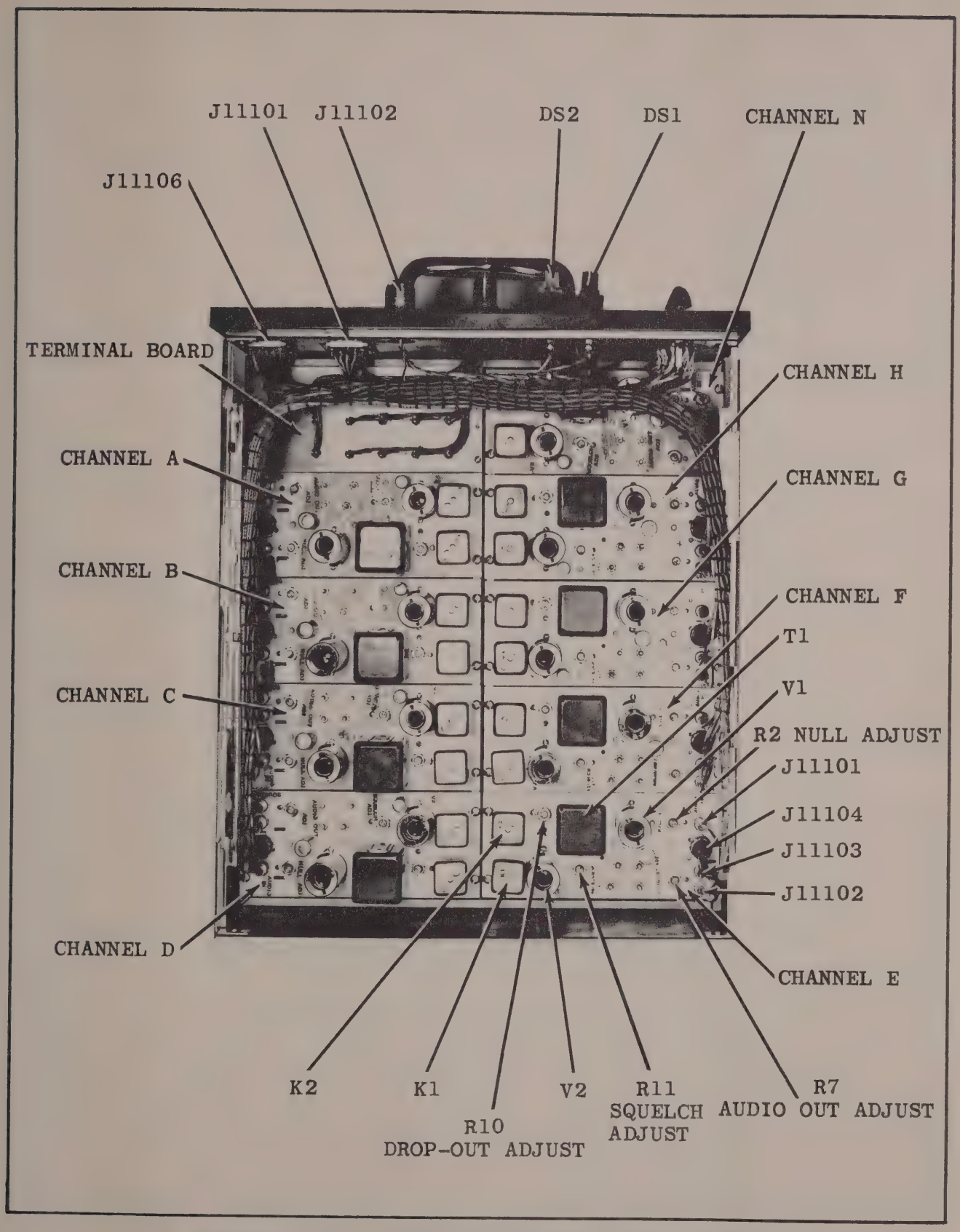


FIGURE 4.13A. HYBRID CABINET, (TOP VIEW)

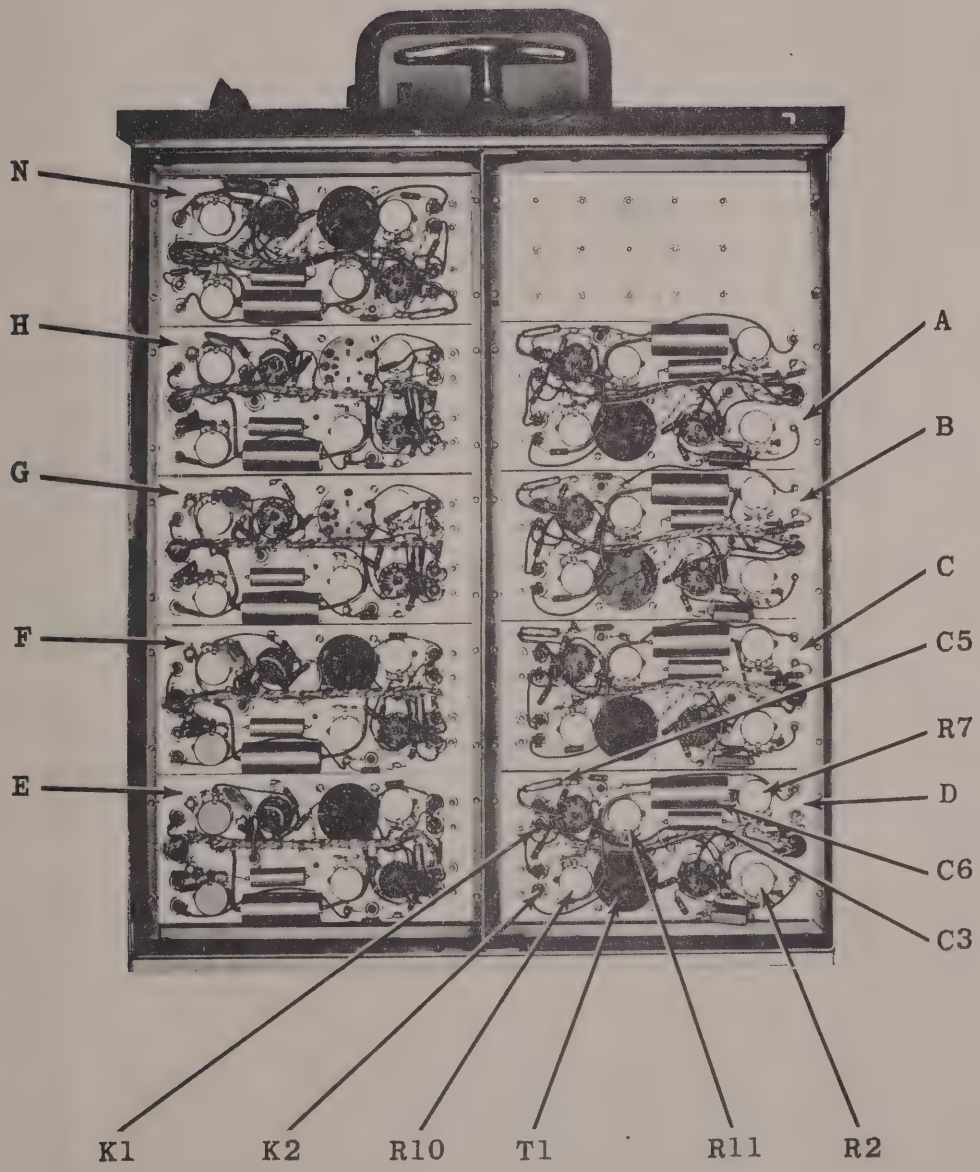


FIGURE 4.13B. HYBRID CABINET, (BOTTOM VIEW)

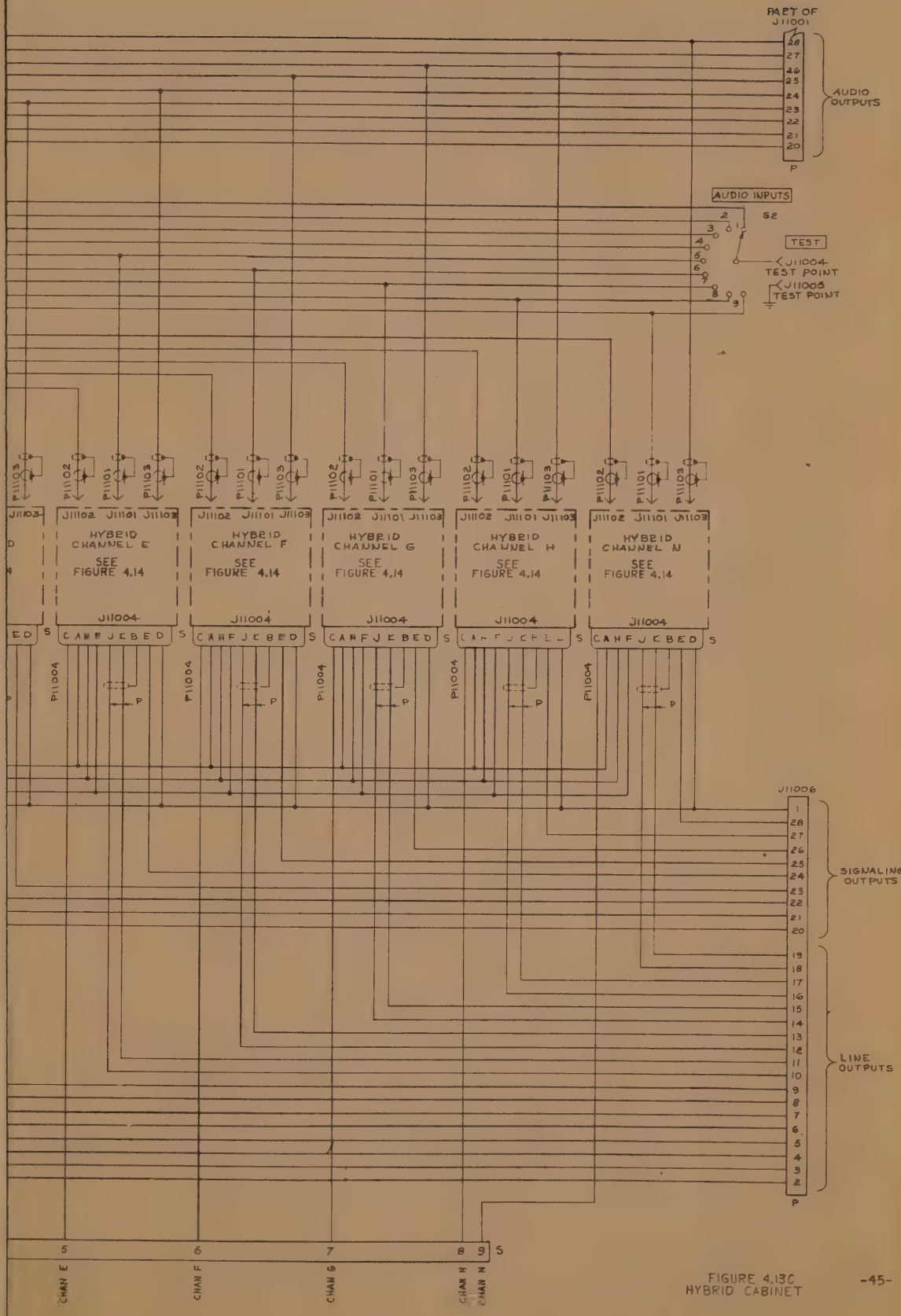


FIGURE 4.13C
HYBRID CABINET

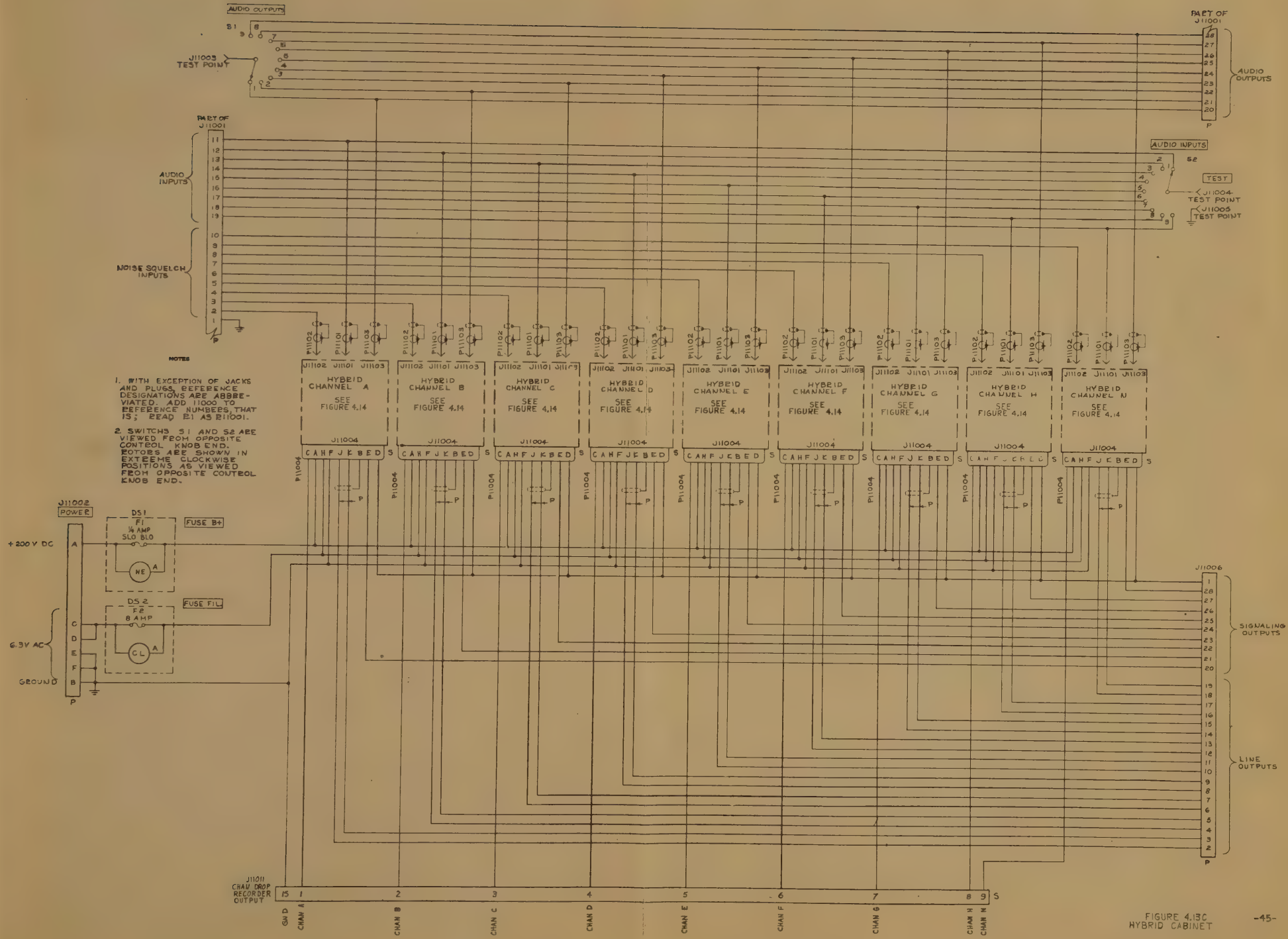


FIGURE 4.13C
HYBRID CABINET

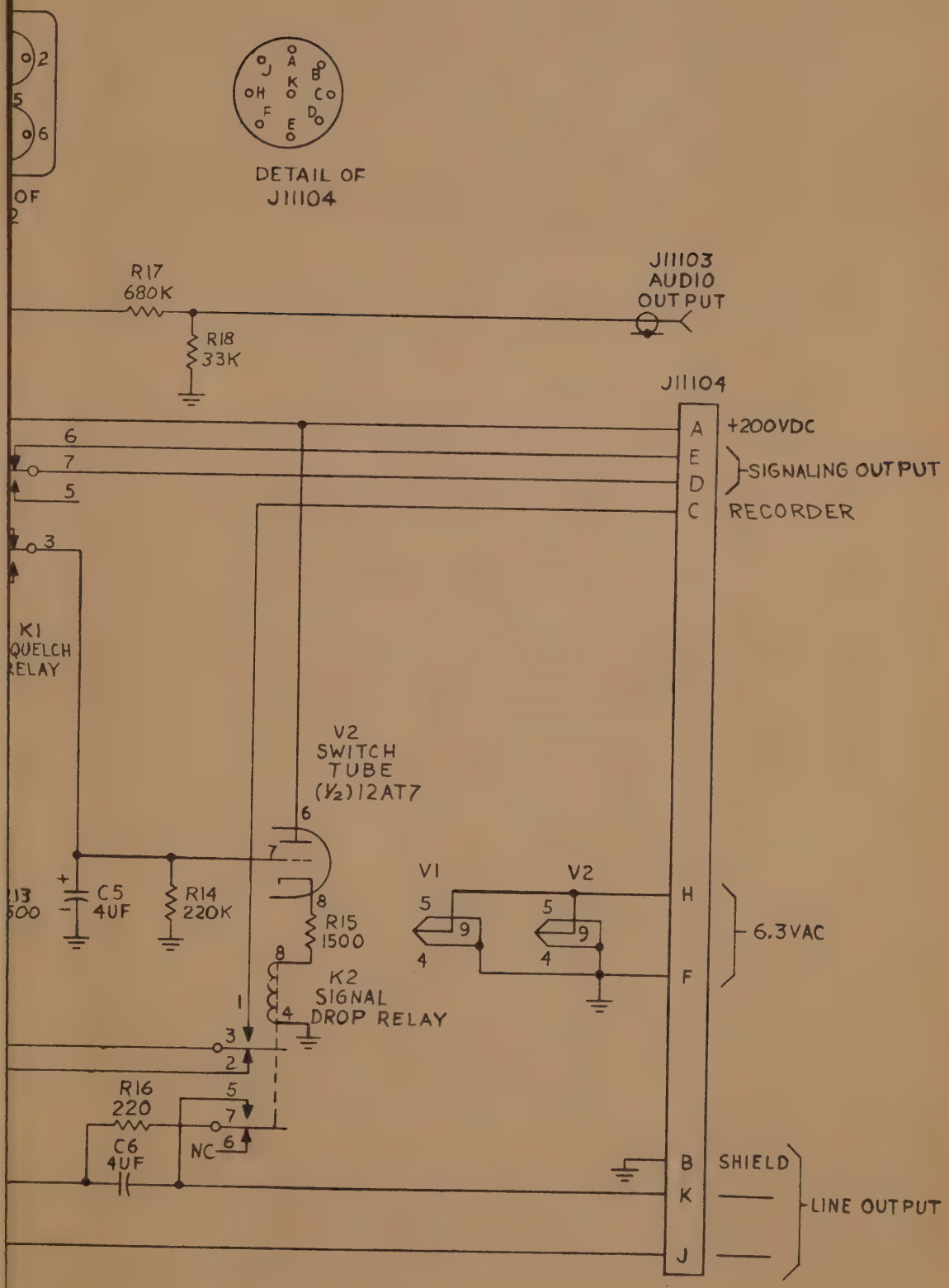
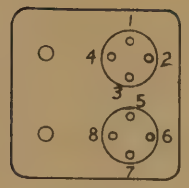


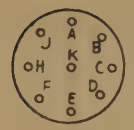
FIGURE 4.14 HYBRID UNIT

NOTES

1. UNLESS OTHERWISE INDICATED;
   ALL RESISTORS ARE IN OHMS, 5%, ½WATT,
   ALL CAPACITORS ARE IN UUF,
   ALL INDUCTORS ARE IN UH.

2. WITH EXCEPTION OF JACKS,
   REFERENCE DESIGNATIONS ARE ABBREVIATED.
   ADD 11100 TO REFERENCE NUMBERS, THAT IS;
   READ R1 AS R11100-1.





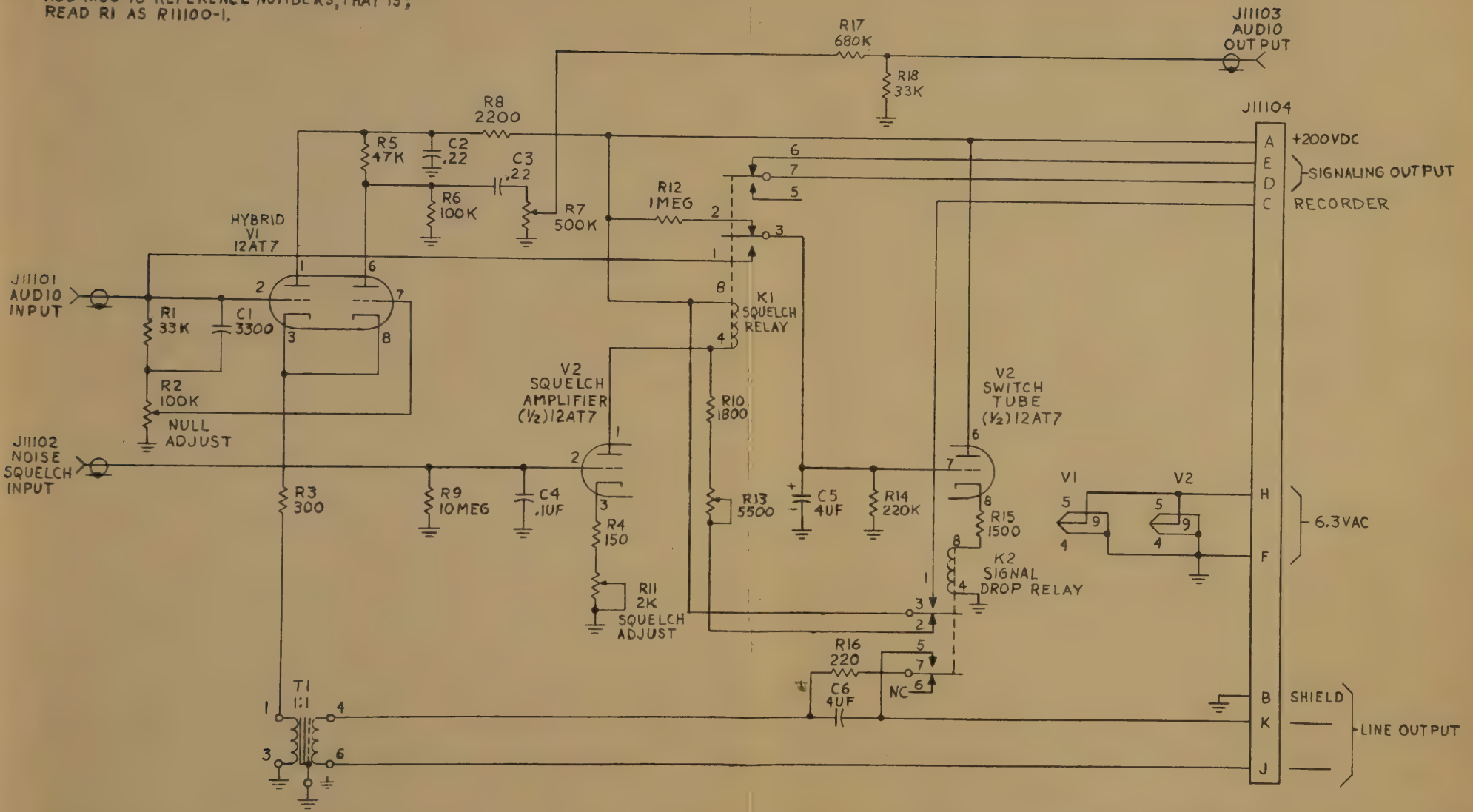


FIGURE 4.14 HYBRID UNIT

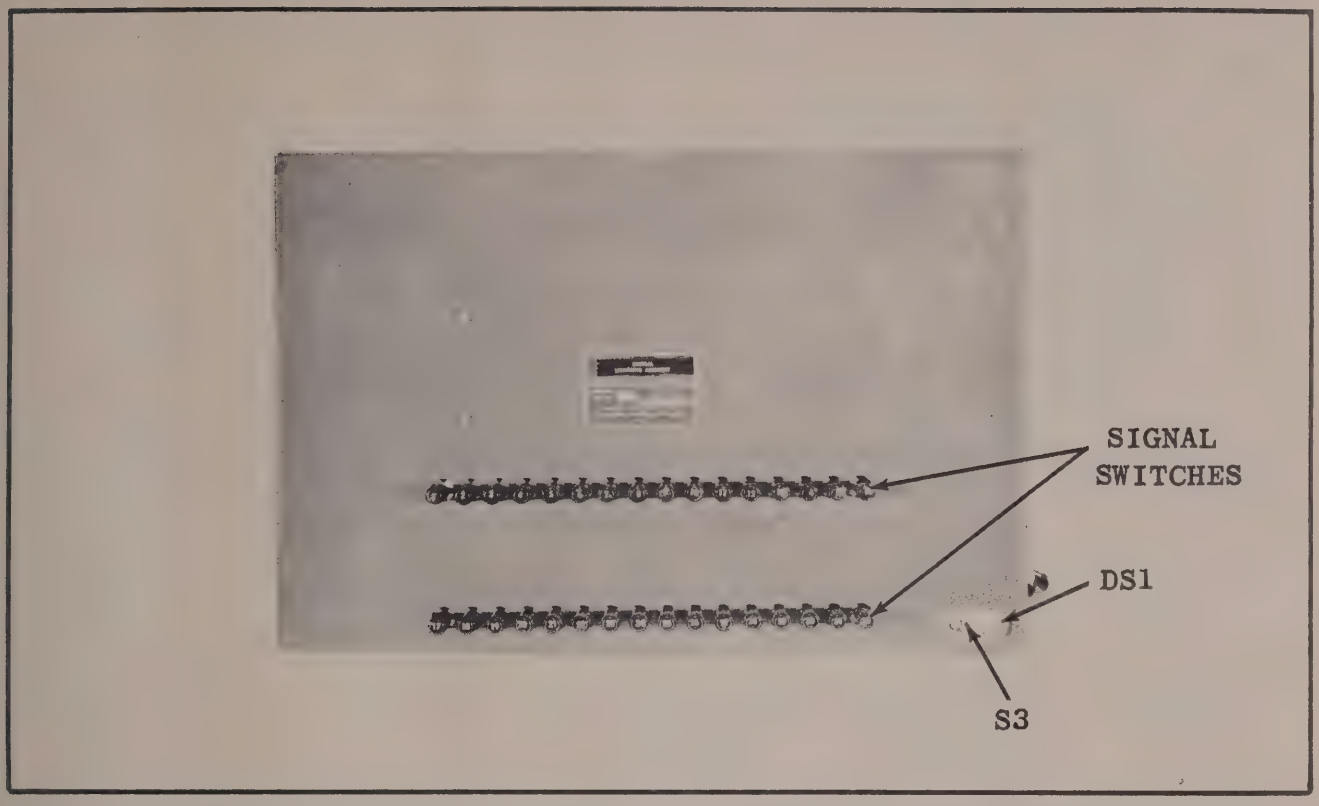


FIGURE 4.15A. SIGNALING CABINET, (FRONT VIEW)

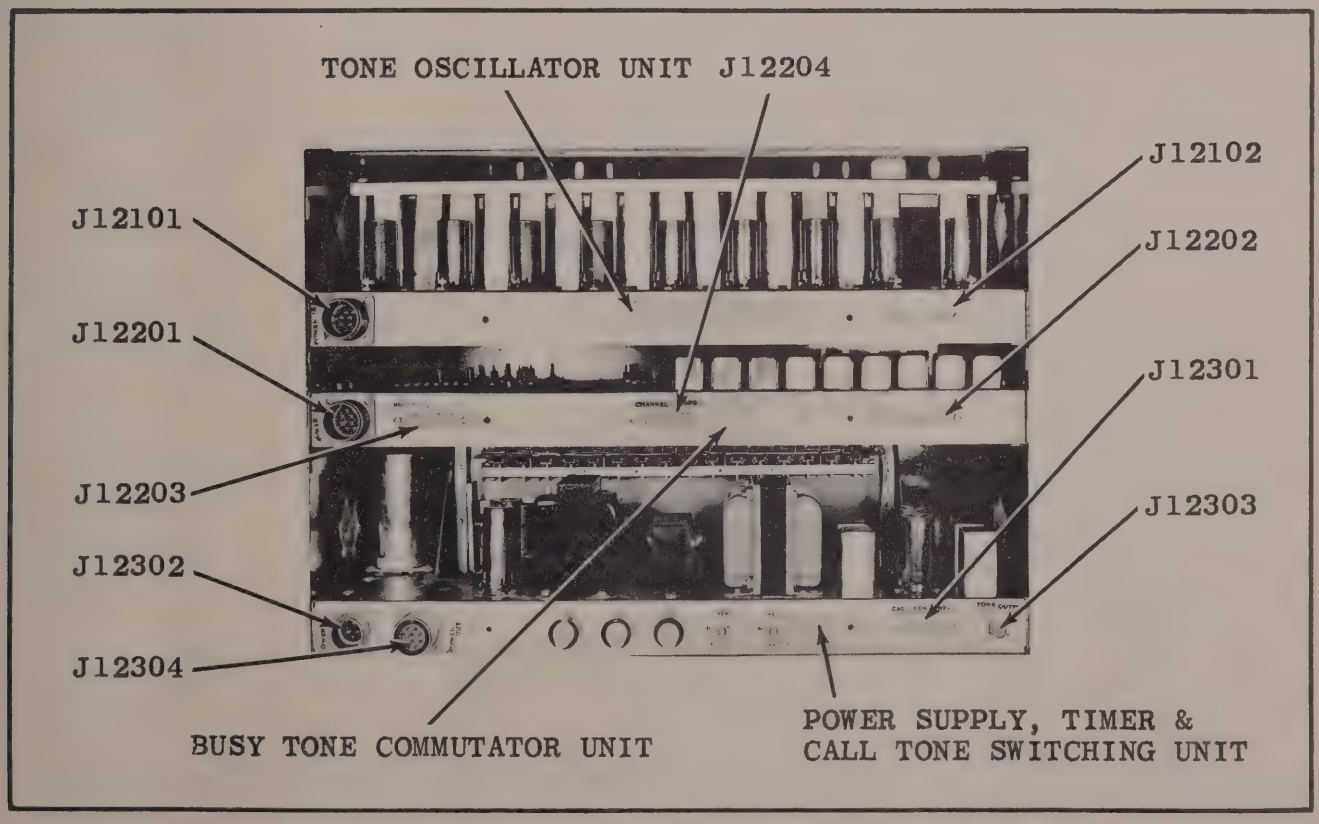


FIGURE 4.15B. SIGNALING CABINET, (REAR VIEW)

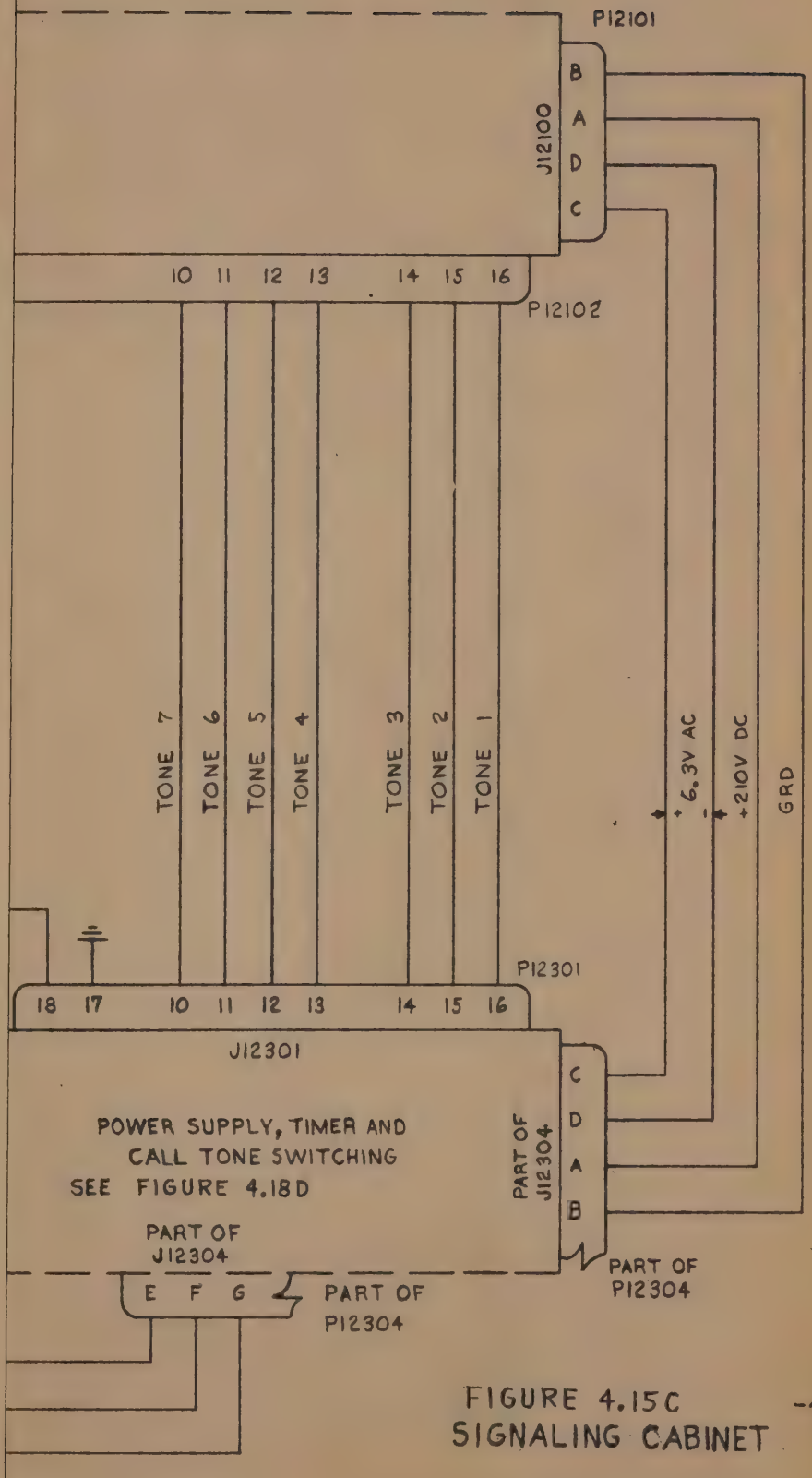


FIGURE 4.15C
SIGNALING CABINET

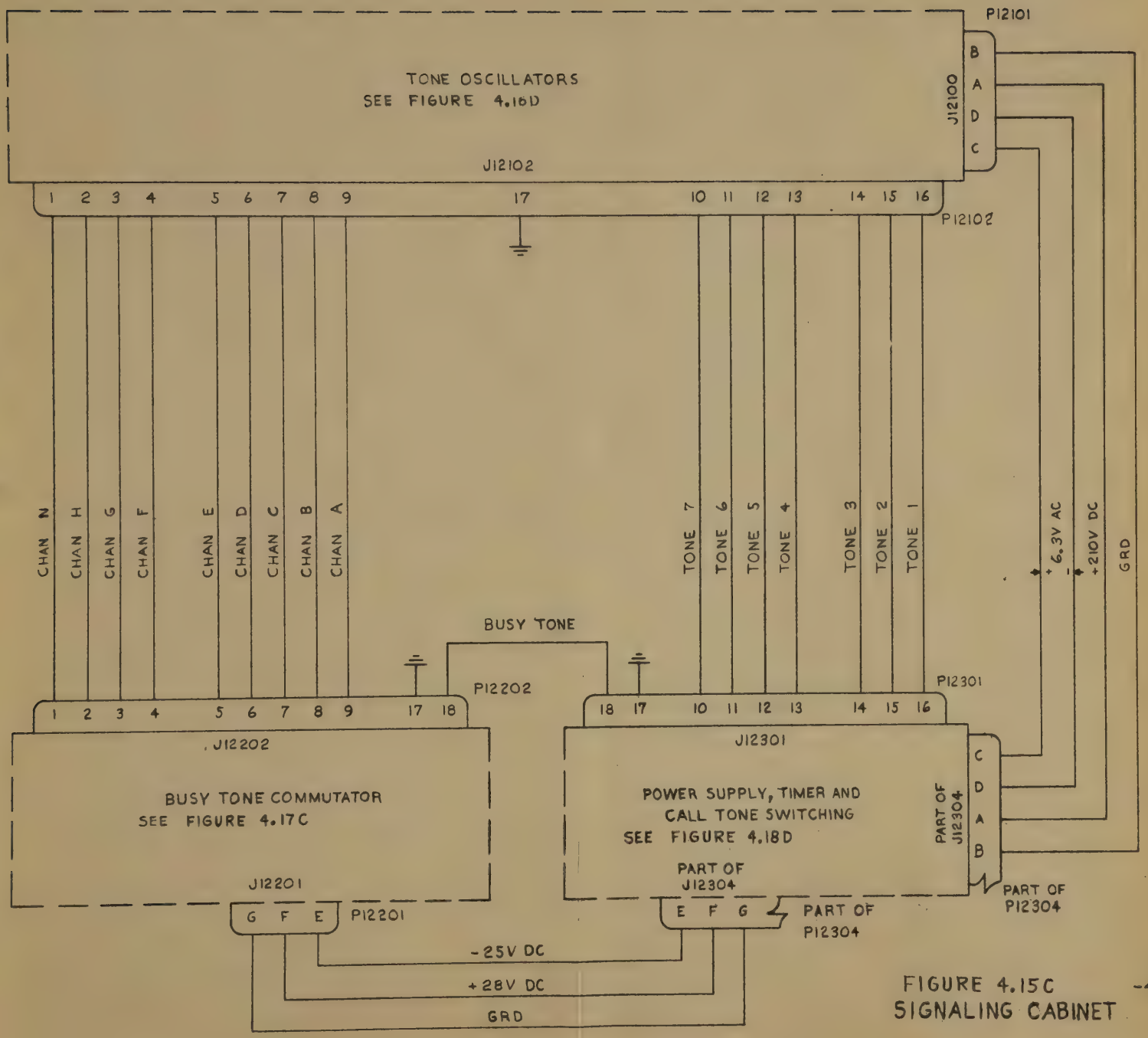


FIGURE 4.15C
SIGNALING CABINET

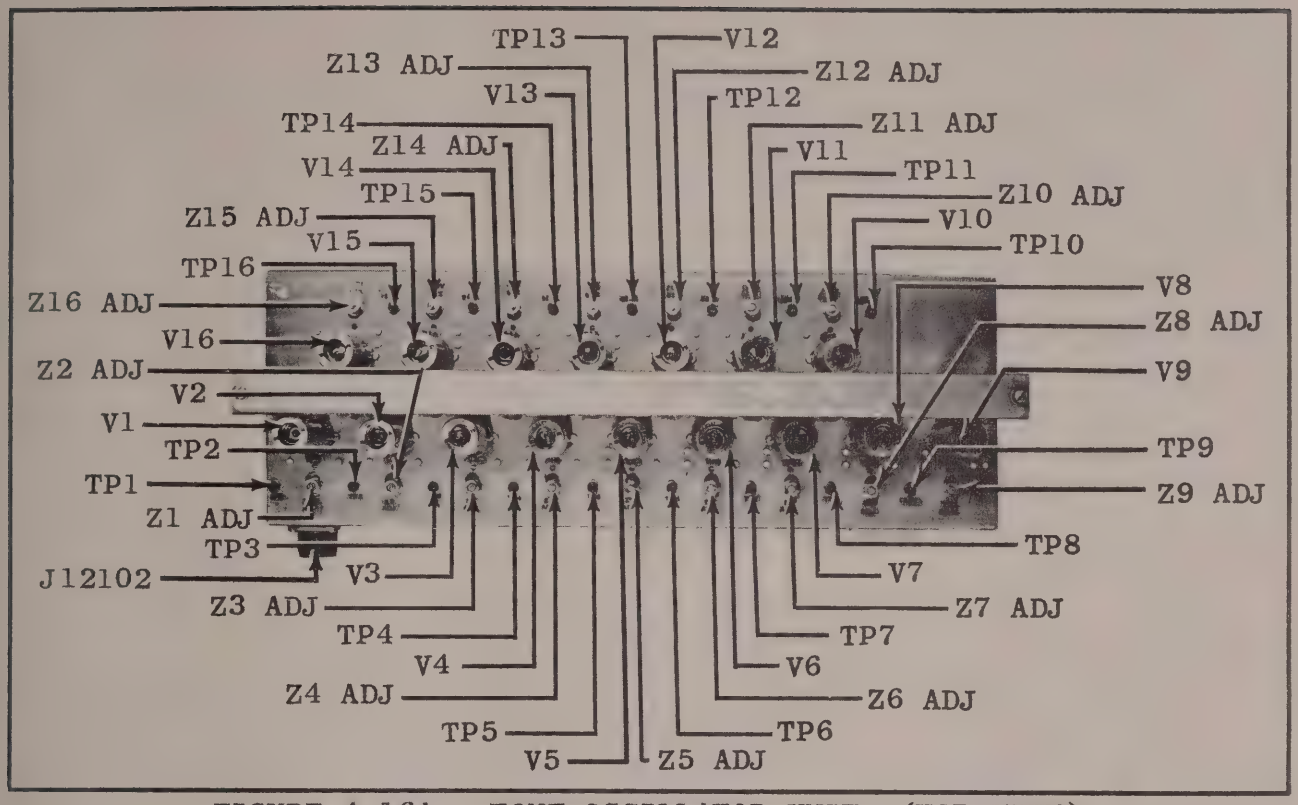


FIGURE 4.16A. TONE OSCILLATOR UNIT, (TOP VIEW)

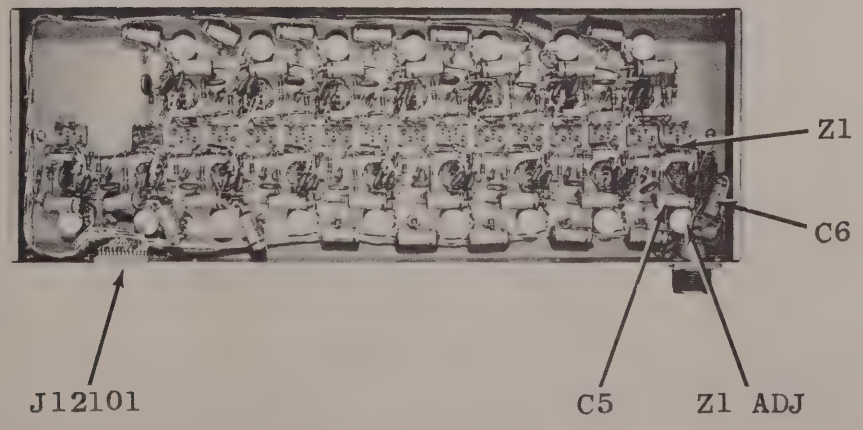


FIGURE 4.16B. TONE OSCILLATOR UNIT, (BOTTOM VIEW)

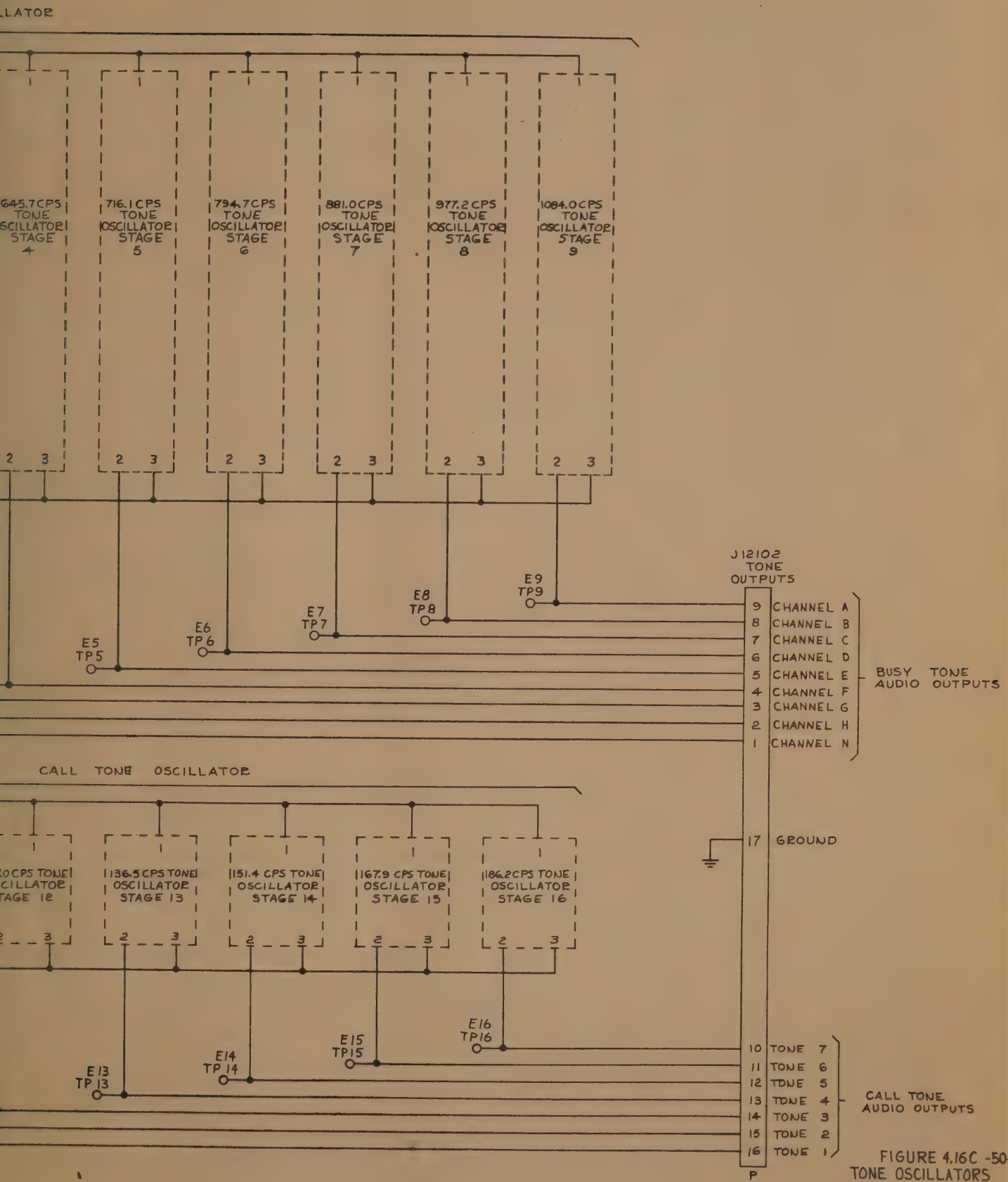


FIGURE 4.16C -50-
TONE OSCILLATORS

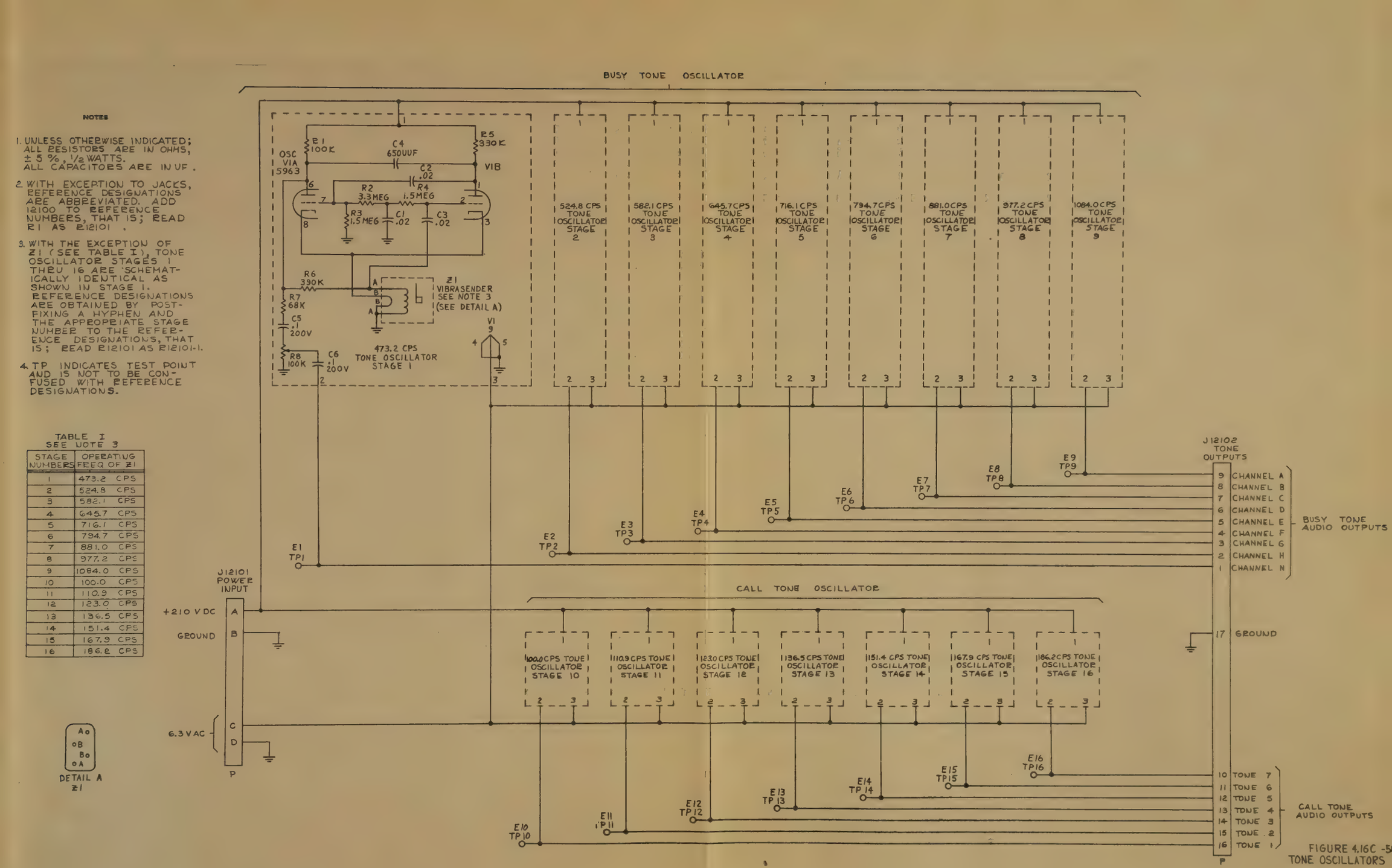


FIGURE 4.16C -5
TONE OSCILLATORS

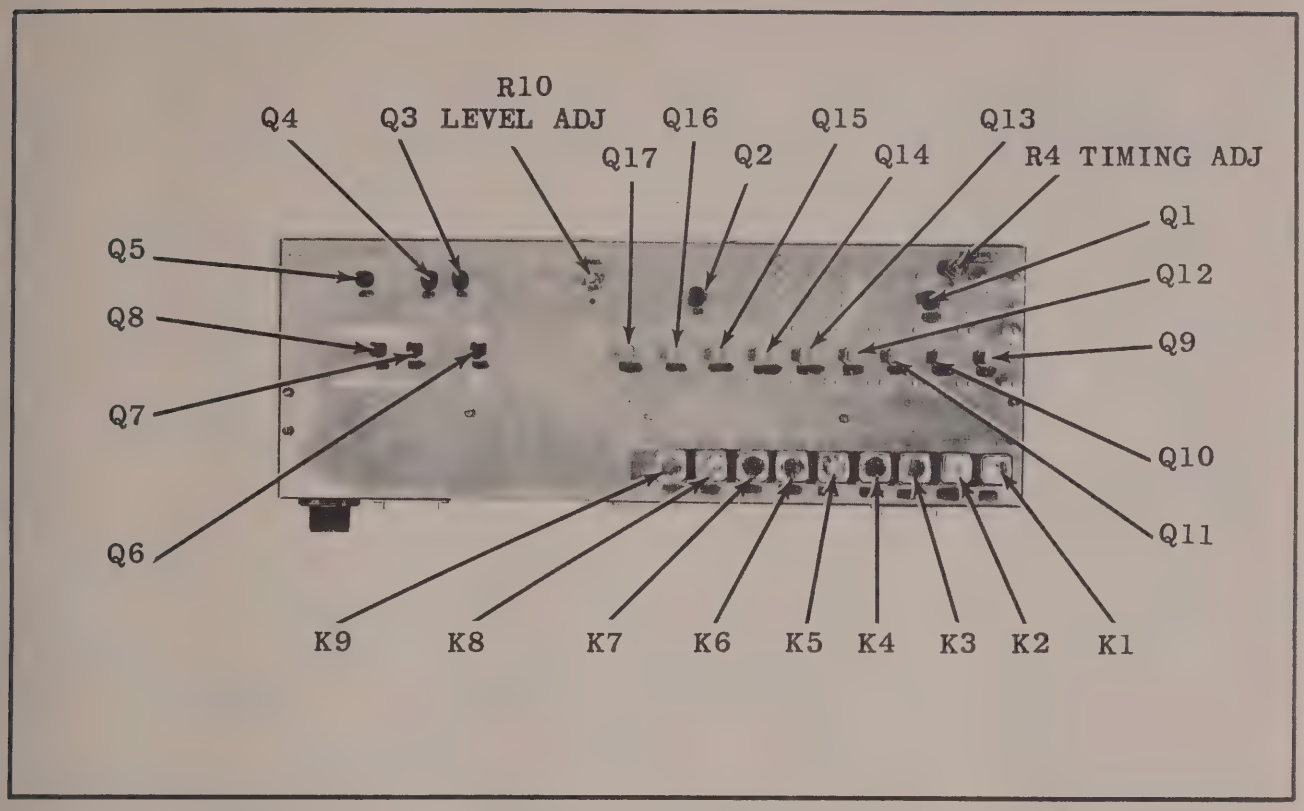


FIGURE 4.17A. BUSY TONE COMMUTATOR, (TOP VIEW)

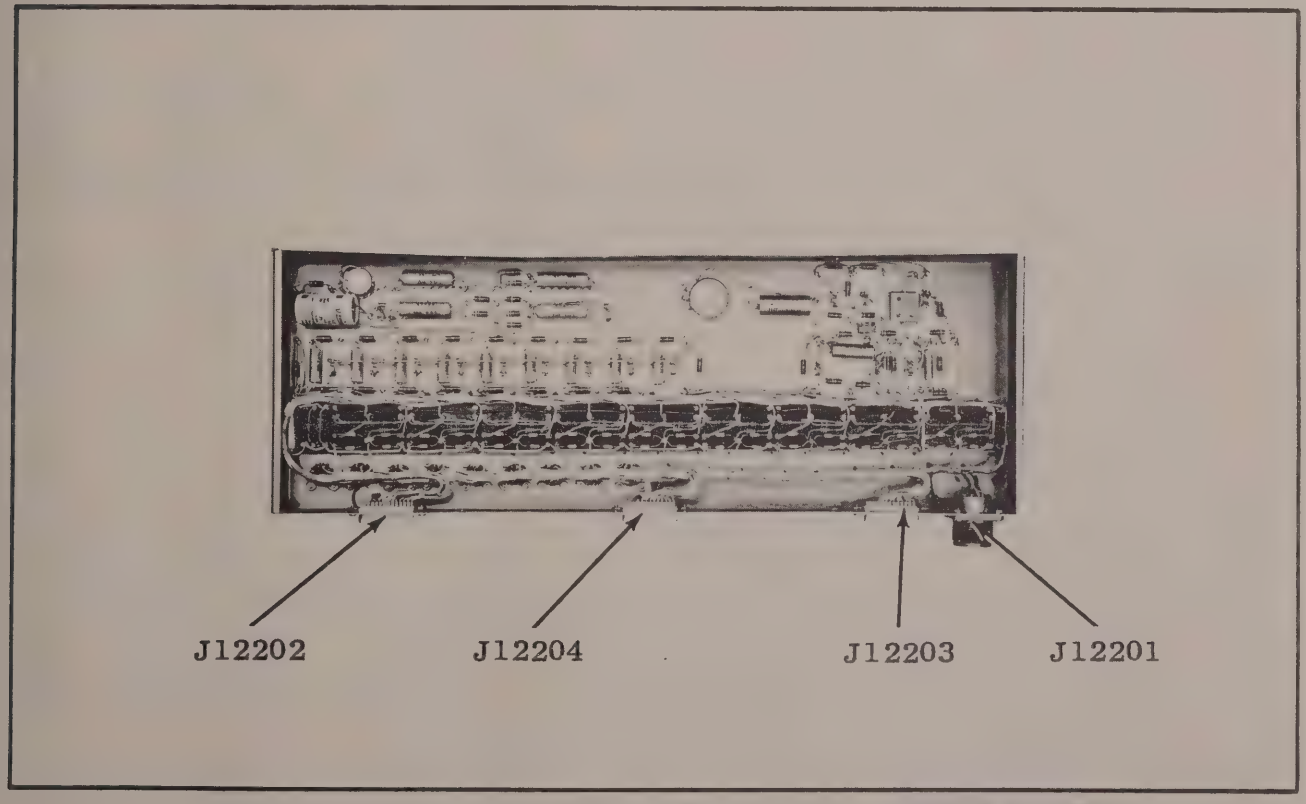


FIGURE 4.17B. BUSY TONE COMMUTATOR, (BOTTOM VIEW)

NOTES

1. UNLESS OTHERWISE INDICATED:
   ALL RESISTORS ARE IN OHMS
   ±5%, 1/2 WATT;
   ALL CAPACITORS ARE IN UUF.

2. WITH EXCEPTION OF JACKS, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 12200 TO REFERENCE NUMBERS, THAT IS; READ R1 AS R12201.

3. COMMUTATOR STAGES 1 THRU 9 ARE SCHEMATICALLY IDENTICAL AS SHOWN IN STAGE 1. REFERENCE DESIGNATIONS ARE OBTAINED BY POST-FIXING A HYPHEN AND THE APPROPRIATE STAGE NUMBER TO REFERENCE DESIGNATIONS, THAT IS; READ R12230 AS R12230-1.

4. WAVEFORMS SHOWN ARE ALL 9 BUSY TONES ACTIVE WITH THE GATE CONTROLLED BY THE MULTIVIBRATOR (EQUIVALENT TO ALL PLUGS INSERTED IN SWITCHBOARD).

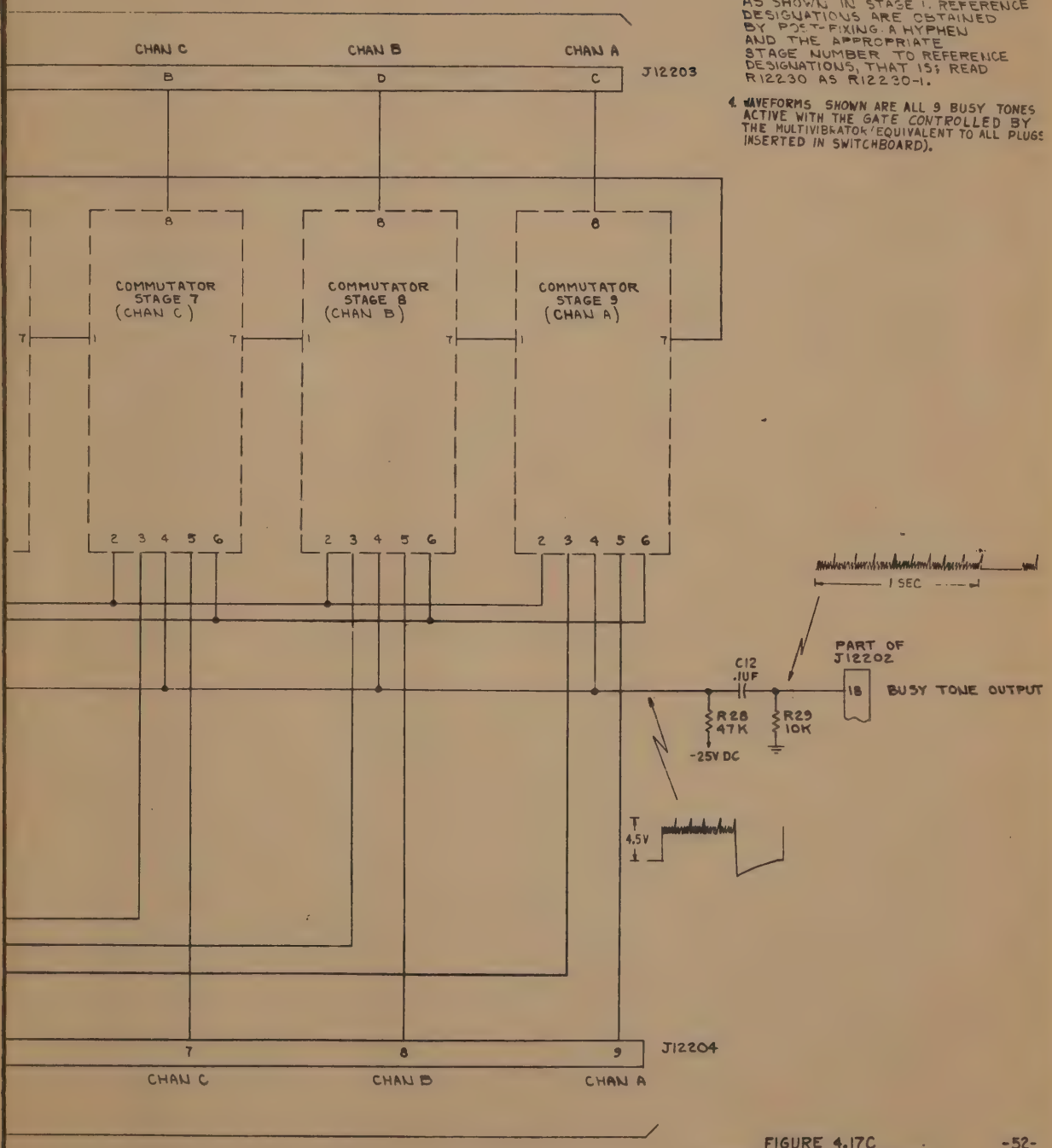
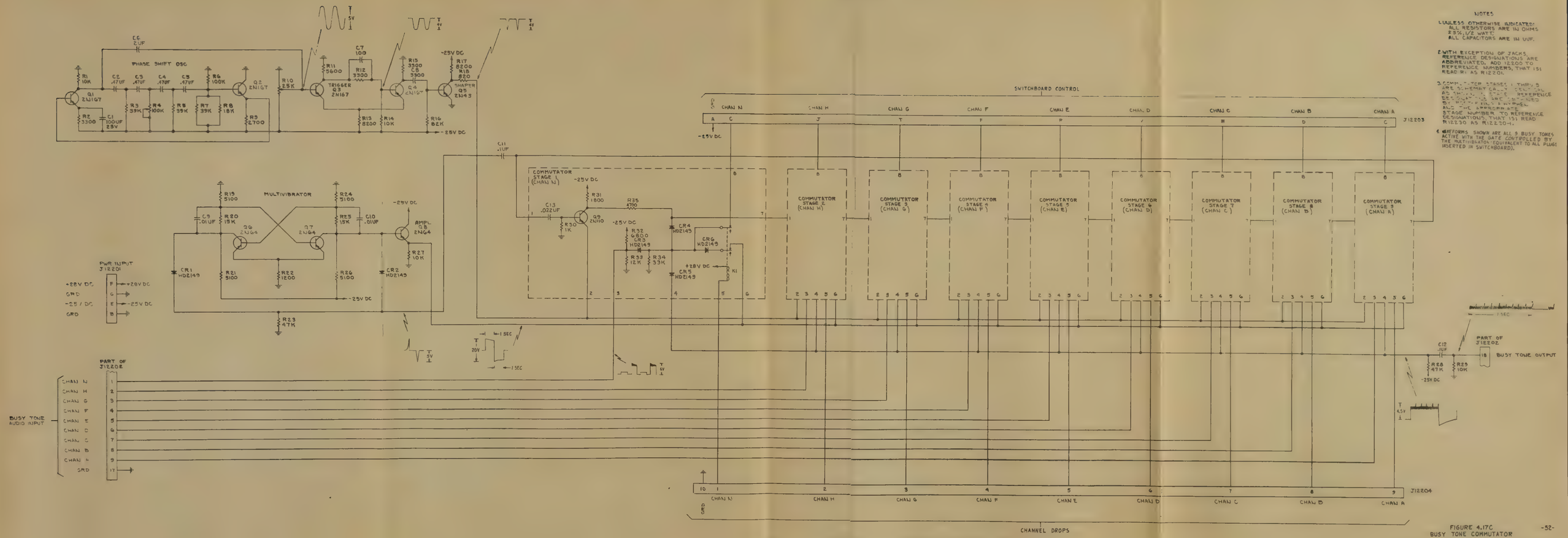


FIGURE 4.17C
BUSY TONE COMMUTATOR



NOTES

1. UNLESS OTHERWISE INDICATED: ALL RESISTORS ARE IN OHMS 5% 1/2 WATT. ALL CAPACITORS ARE IN UUF.
2. WITH EXCEPTION OF JACKS, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 12200 TO REFERENCE NUMBERS, THAT IS: READ R1 AS R12201.
3. COMMUTATOR STAGES 1 THRU 9 ARE SCHEMATICALLY SHOWN AS SHOWN IN FIG. REFERENCE DESIGNATIONS ARE ABBREVIATED BY OMITTING THE NUMBER AND THE LETTER PREFIX. STAGE NUMBER TO REFERENCE DESIGNATIONS, THAT IS, READ R12230 AS R12230-1.
4. WAVEFORMS SHOWN ARE ALL 9 BUSY TONES ACTIVE WITH THE GATE CONTROLLED BY THE MULTIVIBRATOR (EQUIVALENT TO ALL PLUGS INSERTED IN SWITCHBOARD).

FIGURE 4.17C
BUSY TONE COMMUTATOR

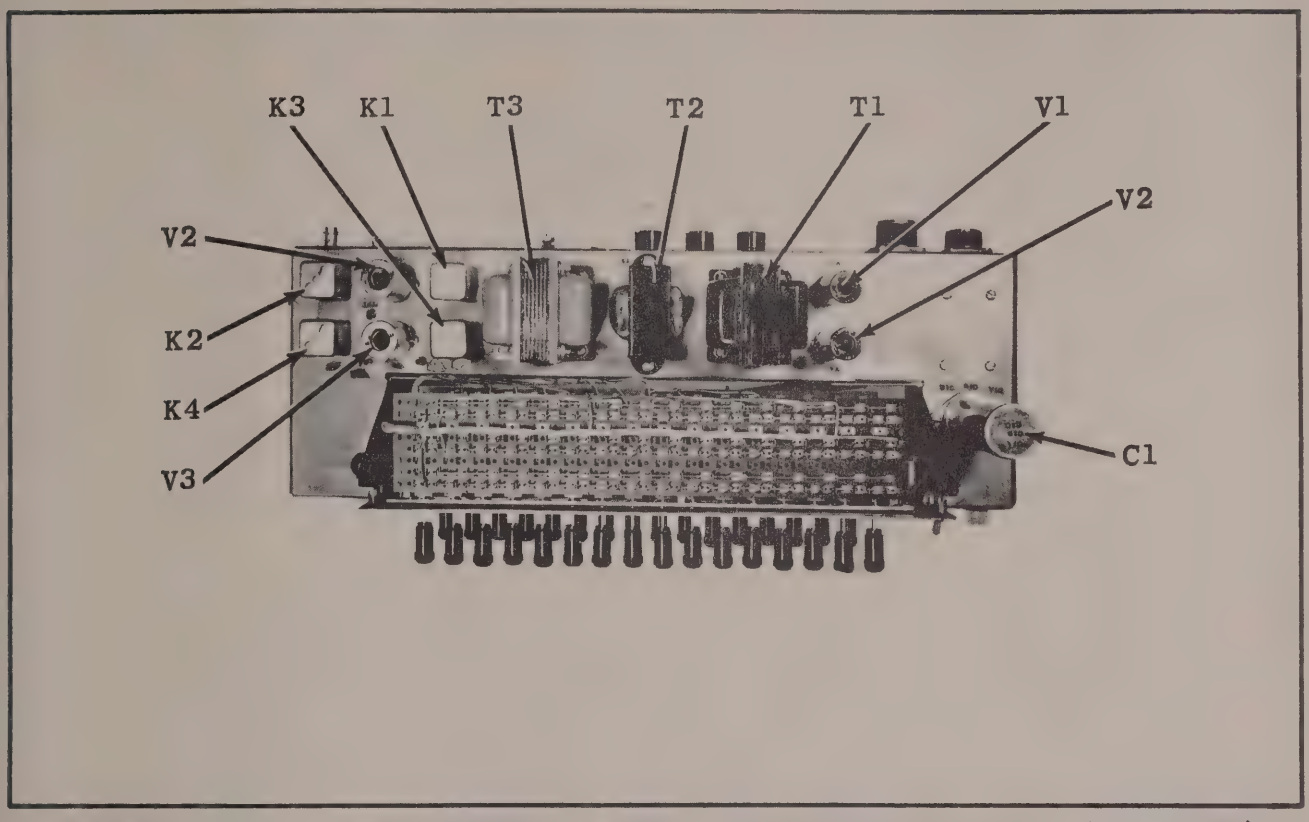


FIGURE 4.18A. POWER SUPPLY, TIMER AND SWITCHING UNIT, (TOP VIEW)

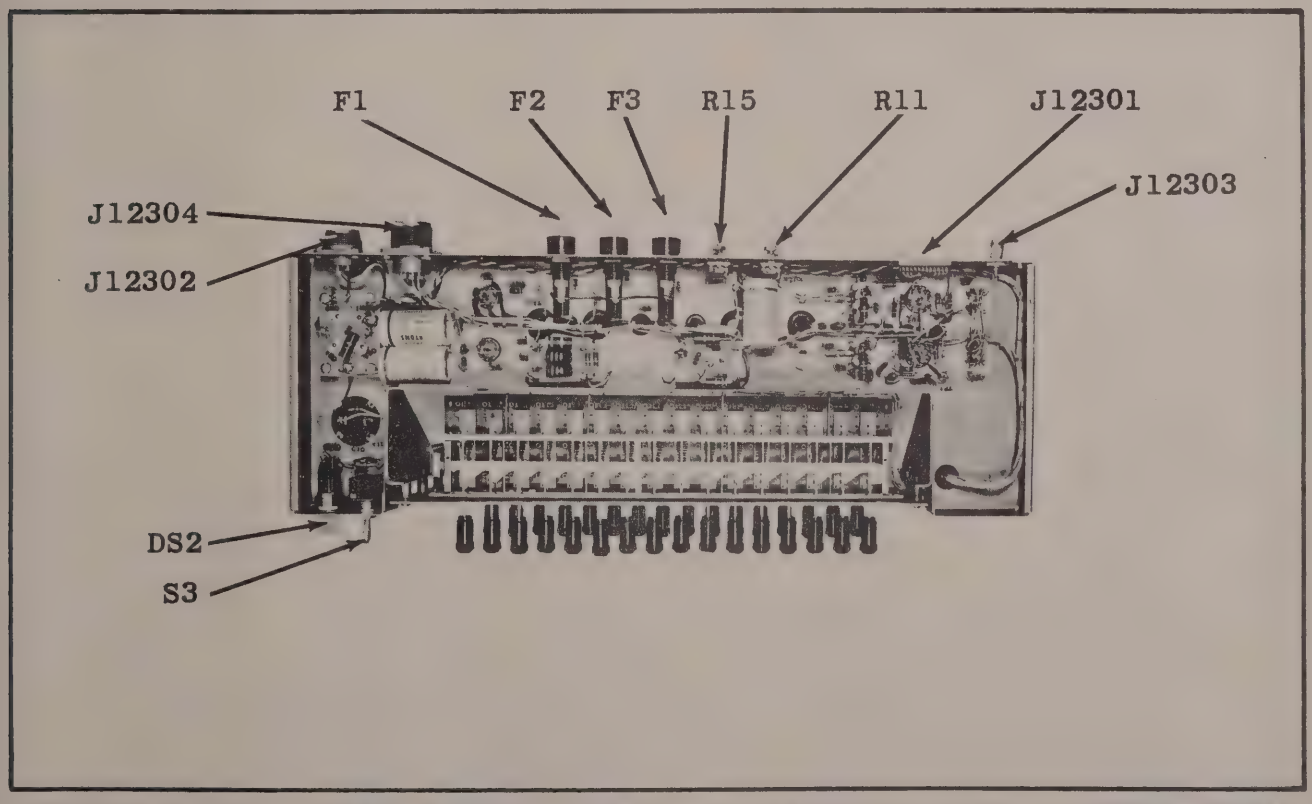


FIGURE 4.18B. POWER SUPPLY, TIMER AND SWITCHING UNIT, (BOTTOM VIEW)

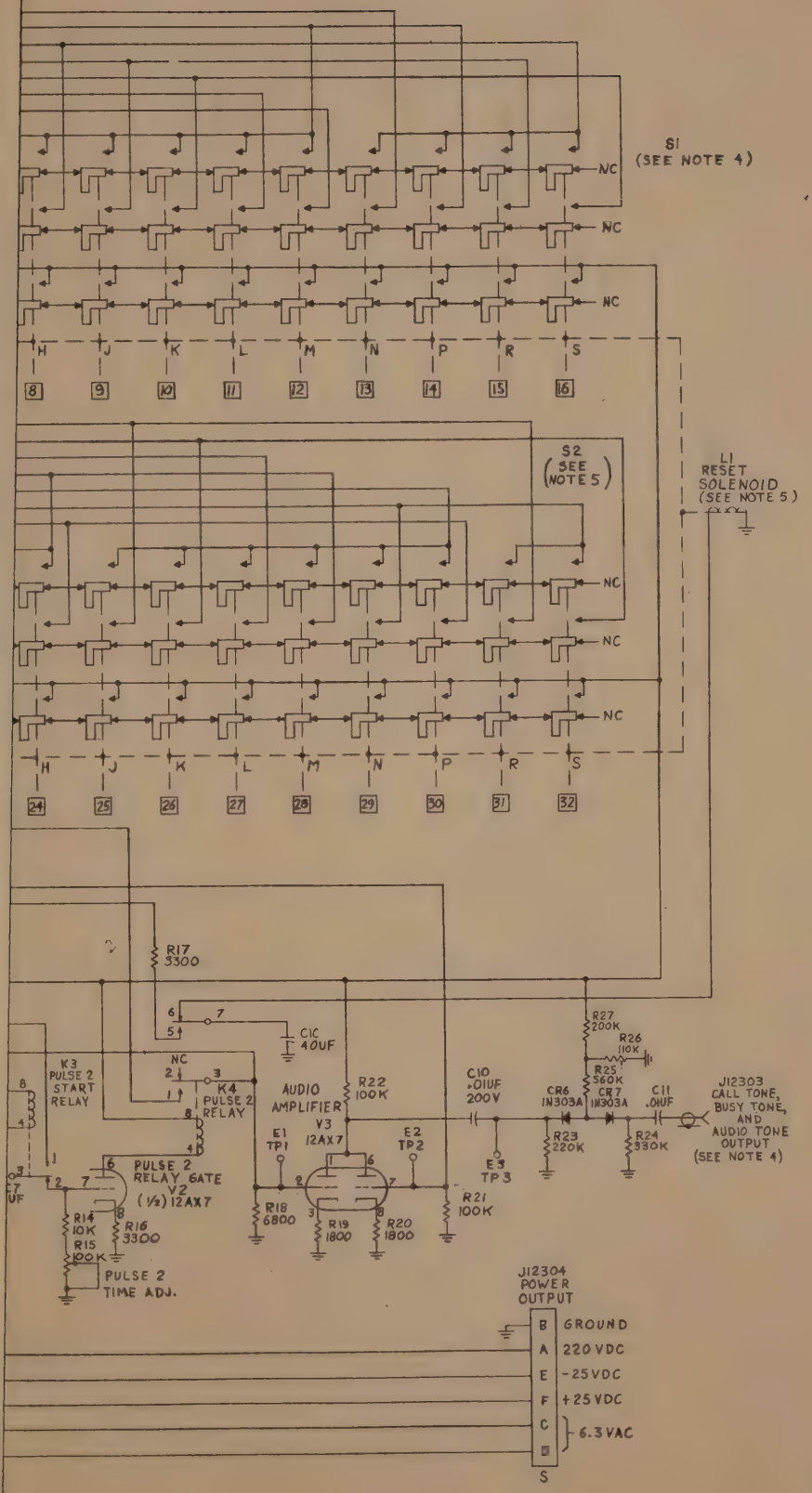


TABLE I
CALL TONE CODE

SUBSCRIBER PUSH BUTTON NUMBER	TONE SEQUENCE	
	PULSE 1 TONE	PULSE 2 TONE
1	1	2
2	1	3
3	1	4
4	1	5
5	1	6
6	1	7
7	2	1
8	2	3
9	2	4
10	2	5
11	2	6
12	2	7
13	3	1
14	3	2
15	3	4
16	3	5
17	3	6
18	3	7
19	4	1
20	4	2
21	4	3
22	4	5
23	4	6
24	4	7
25	5	1
26	5	2
27	5	3
28	5	4
29	5	6
30	5	7
31	6	1
32	6	2

FIGURE 4.18C
POWER SUPPLY
TIMER AND CALL TONE
SWITCHING UNIT

NOTES

1. UNLESS OTHERWISE INDICATED; ALL RESISTORS ARE IN OHMS, ±5%, ½WATT ALL CAPACITORS ARE IN UUF.

2. WITH EXCEPTION OF JACKS, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 12300 TO REFERENCE NUMBERS, THAT IS, READ R1 AS R12301.

3. TP INDICATES TEST POINT AND IS NOT A REFERENCE DESIGNATION.

4. S1 AND S2 SELECT THE CALL TONES THAT APPEAR ON THE CALL TONE AND BUSY TONE OUTPUT JACK J12303. SEE TABLE I FOR SELECTED CALL TONE CODE.

5. THE PUSHBUTTON SWITCHES S1A THRU S1S AND S2A THRU S2S LOCK IN THE OPERATED POSITION UNTIL RELEASED BY RESET SOLENOID L1 ENERGIZING.

DETAIL OF K1, K2, K3 & K4

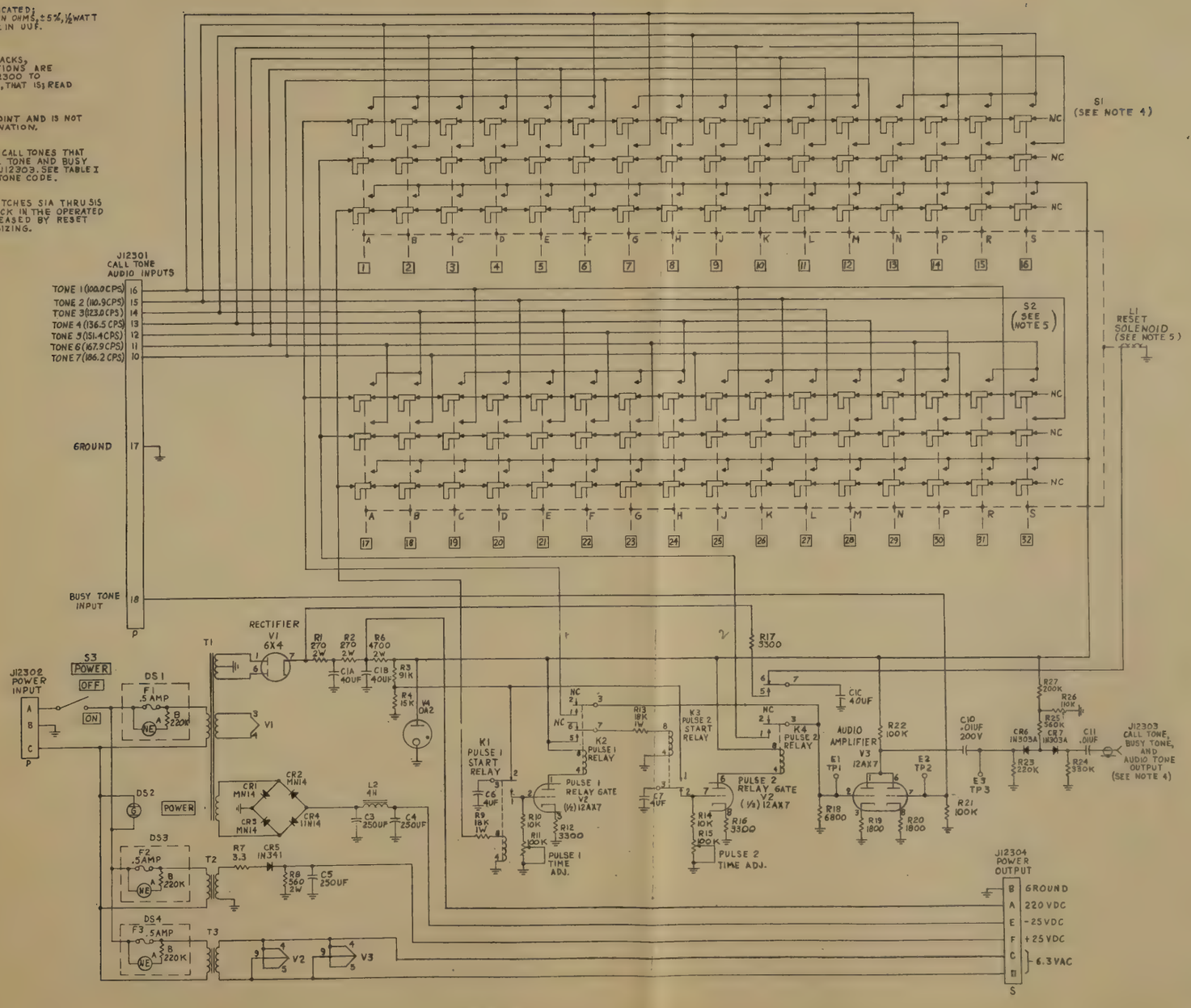


TABLE I
CALL TONE CODE

SUBSCRIBER PUSH BUTTON NUMBER	TONE SEQUENCE PULSE 1 TONE	PULSE 2 TONE
1	1	2
2	1	3
3	1	4
4	1	5
5	1	6
6	1	7
7	2	1
8	2	3
9	2	4
10	2	5
11	2	6
12	2	7
13	3	1
14	3	2
15	3	4
16	3	5
17	3	6
18	3	7
19	4	1
20	4	2
21	4	3
22	4	5
23	4	6
24	4	7
25	5	1
26	5	2
27	5	3
28	5	4
29	5	6
30	5	7
31	6	1
32	6	2

FIGURE 4.18C
POWER SUPPLY TIMER AND CALL TONE SWITCHING UNIT

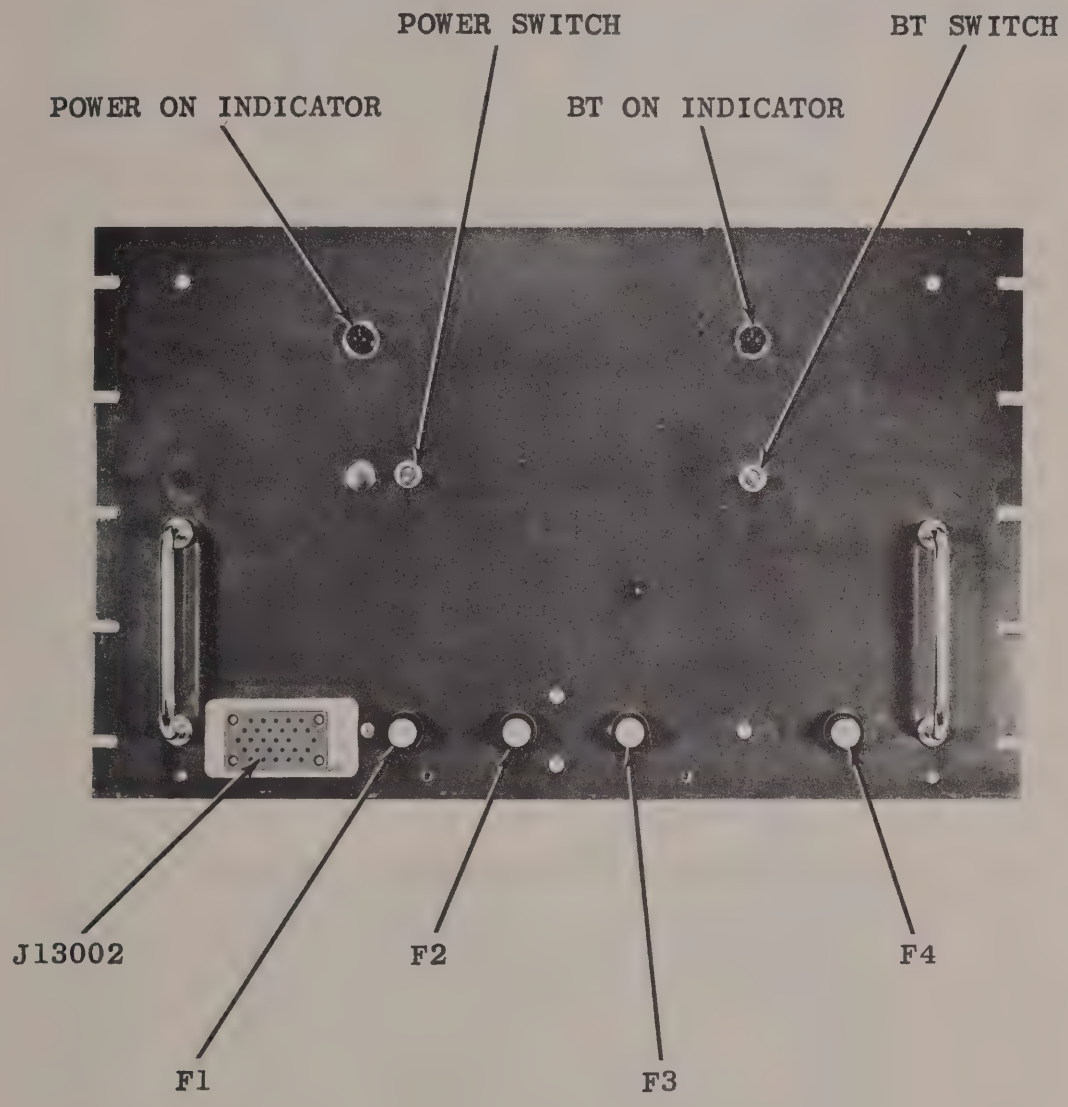


FIGURE 4.19A. RECEIVER POWER SUPPLY (FRONT VIEW)

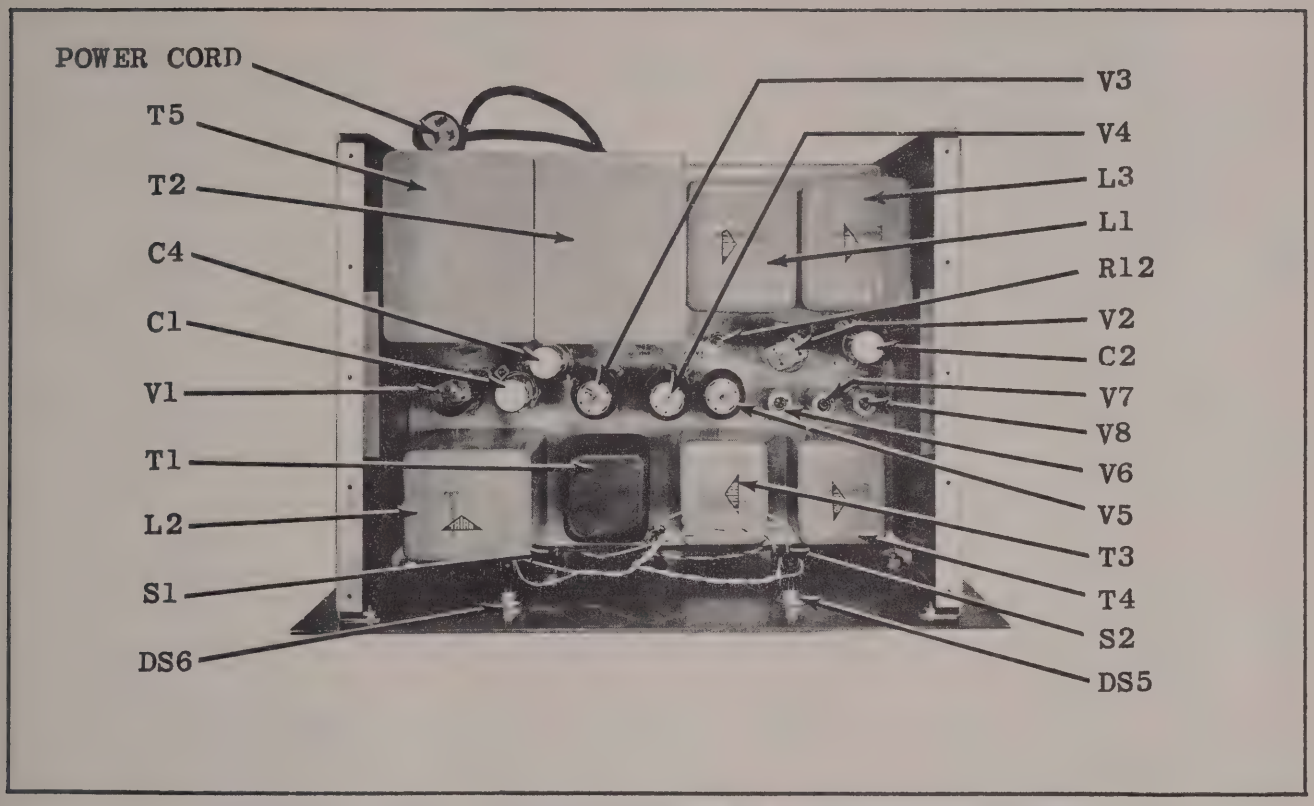


FIGURE 4.19B. RECEIVER POWER SUPPLY (TOP VIEW)

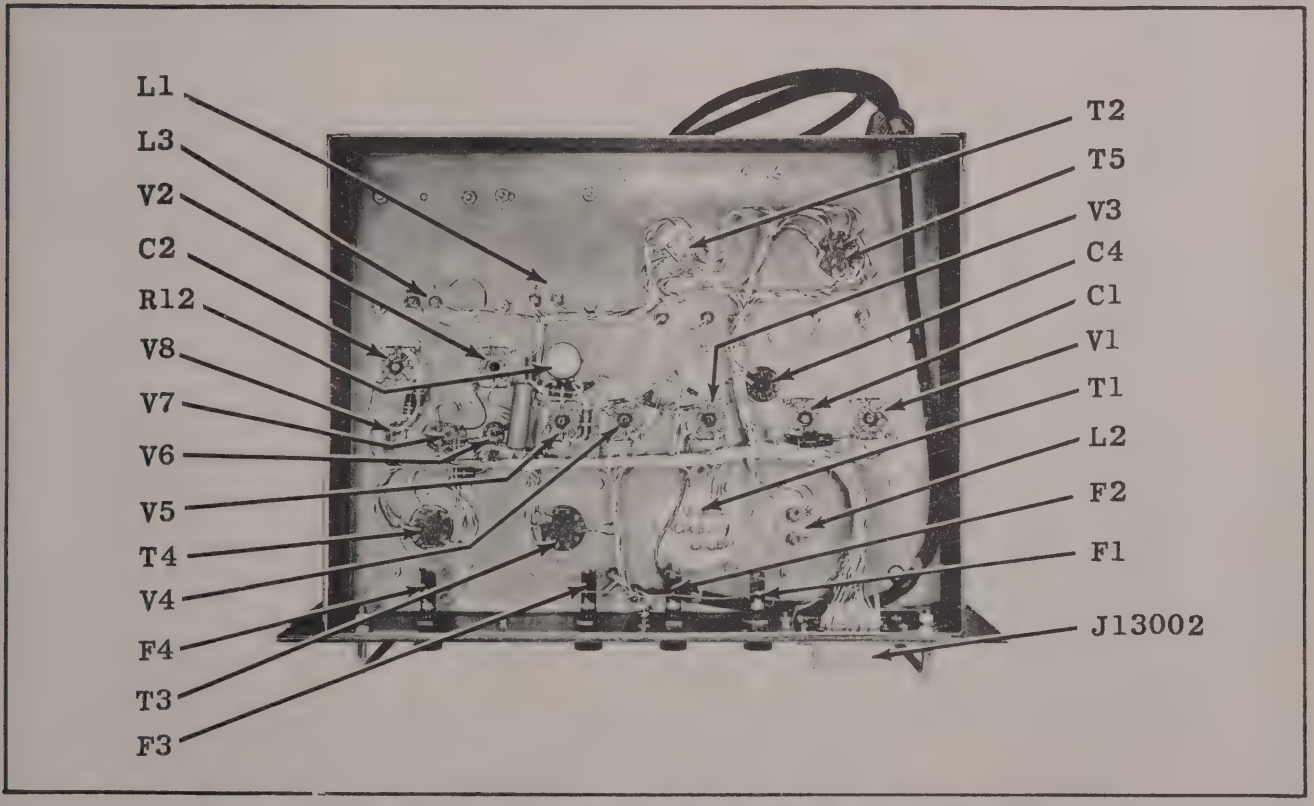


FIGURE 4.19C. RECEIVER POWER SUPPLY (BOTTOM VIEW)

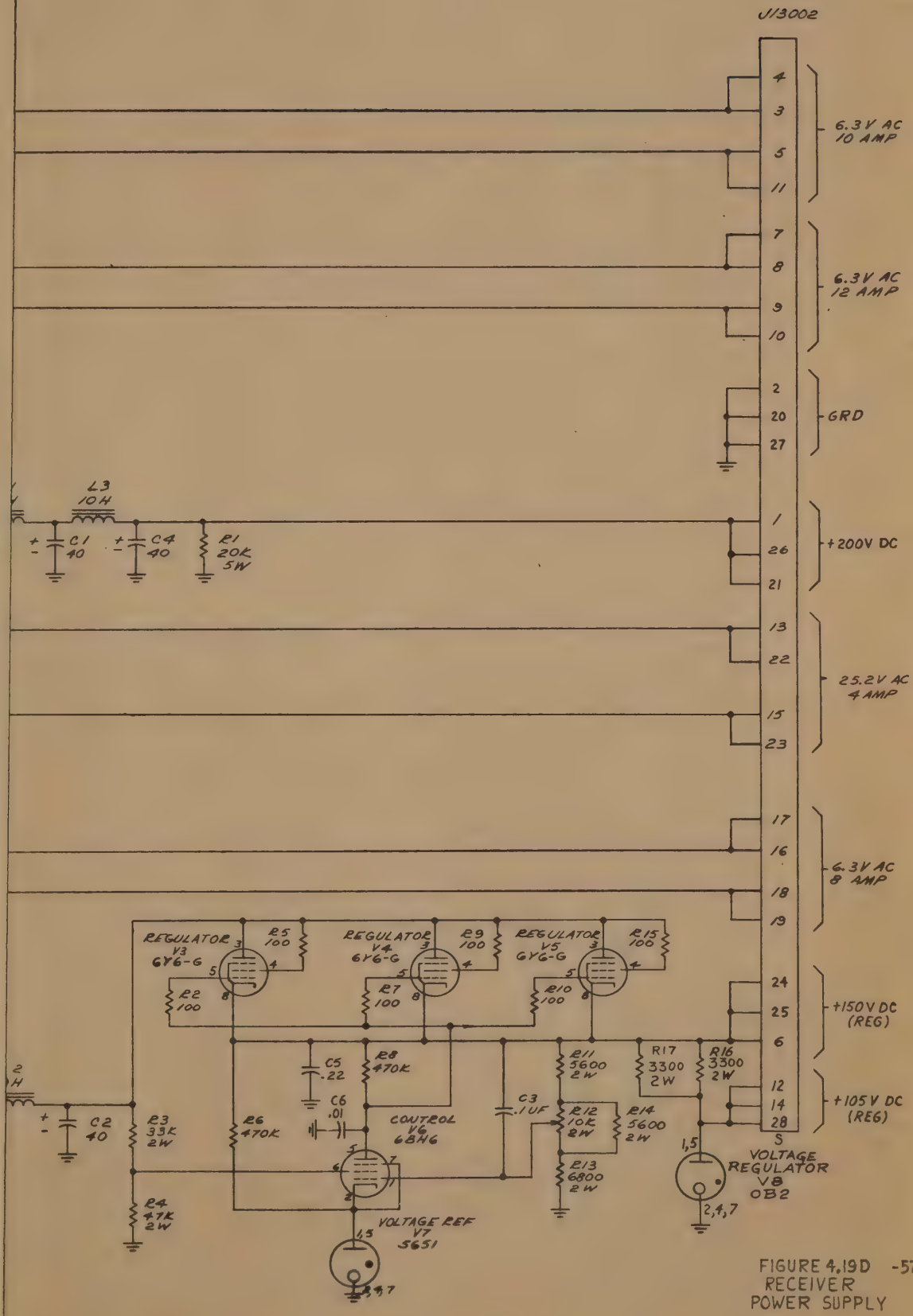
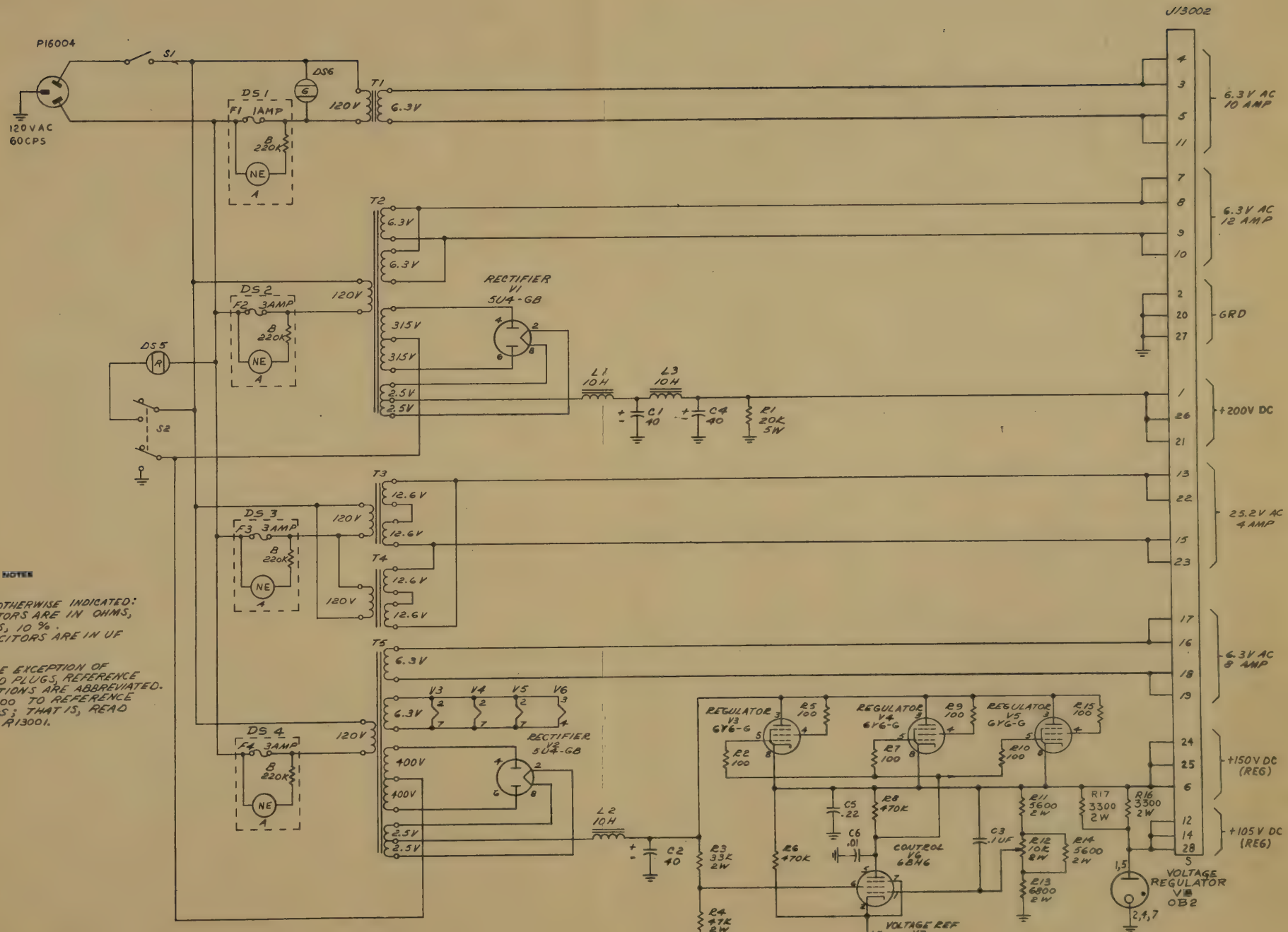


FIGURE 4.19D -57
RECEIVER
POWER SUPPLY



NOTES

1. UNLESS OTHERWISE INDICATED: ALL RESISTORS ARE IN OHMS, 1/2 WATTS, 10 %. ALL CAPACITORS ARE IN UF

2. WITH THE EXCEPTION OF JACKS AND PLUGS, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 13000 TO REFERENCE NUMBERS; THAT IS, READ R1 AS R13001.

FIGURE 4.19D
RECEIVER
POWER SUPPLY

FIGURE 4.19D
RECEIVER
POWER SUPPLY

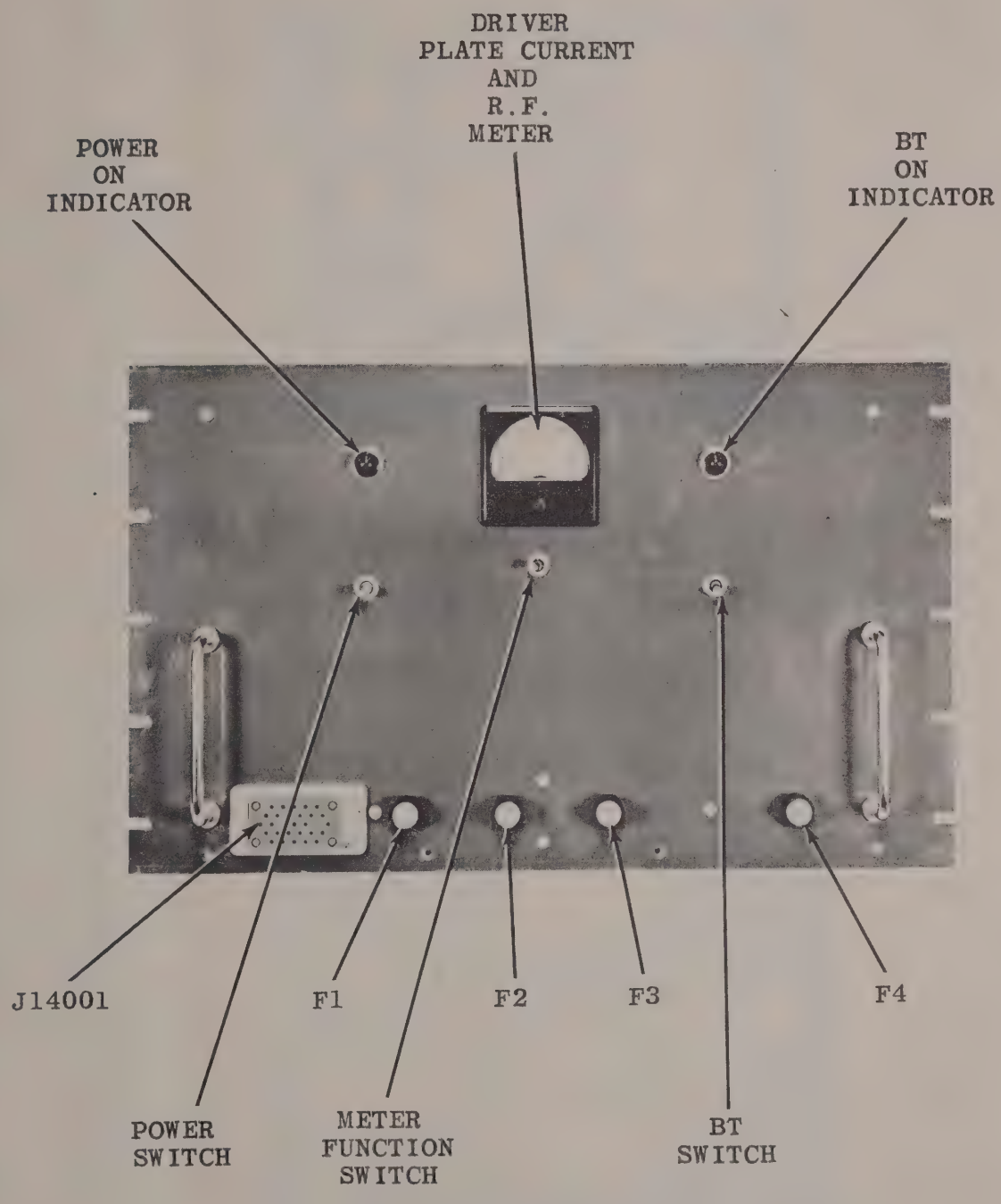


FIGURE 4.20A. TRANSMITTER L.V. POWER SUPPLY (FRONT VIEW)

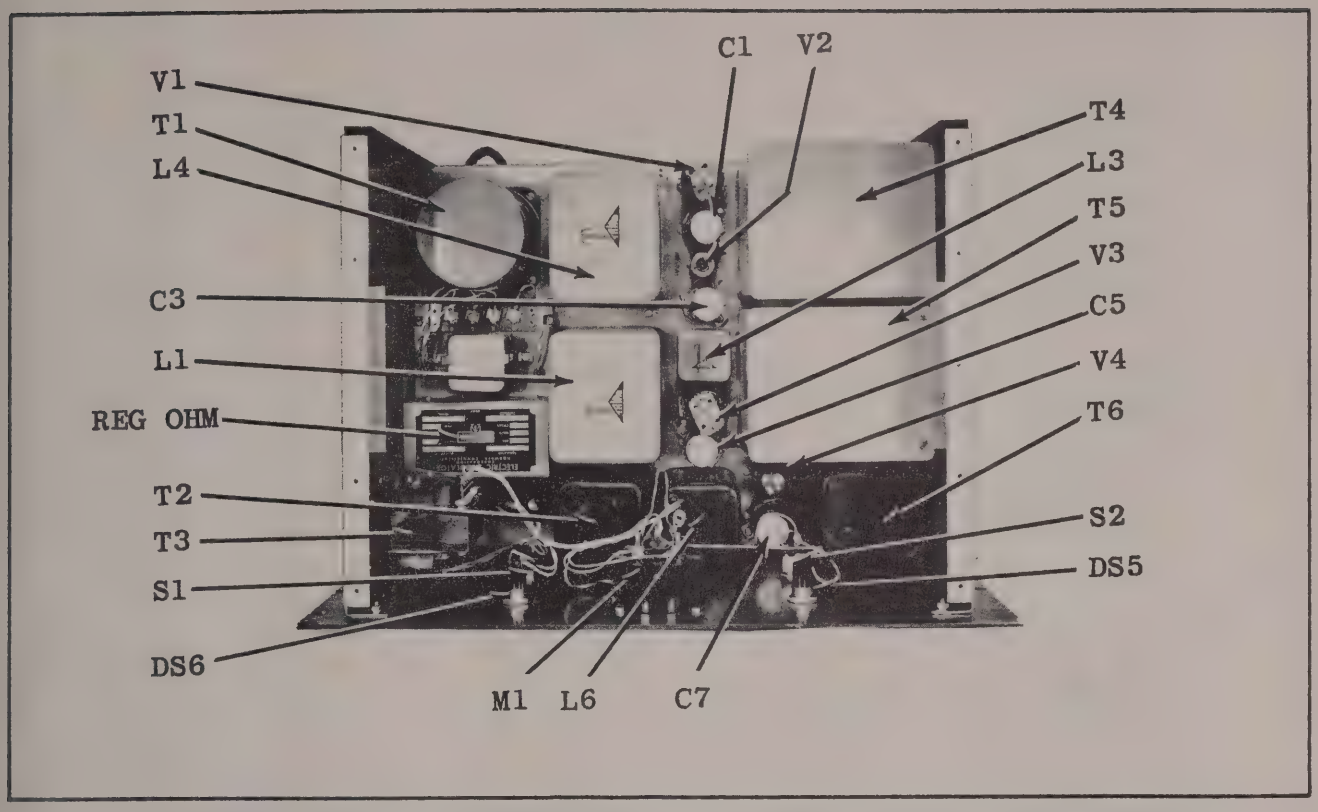


FIGURE 4.20B. TRANSMITTER L.V. POWER SUPPLY (TOP VIEW)

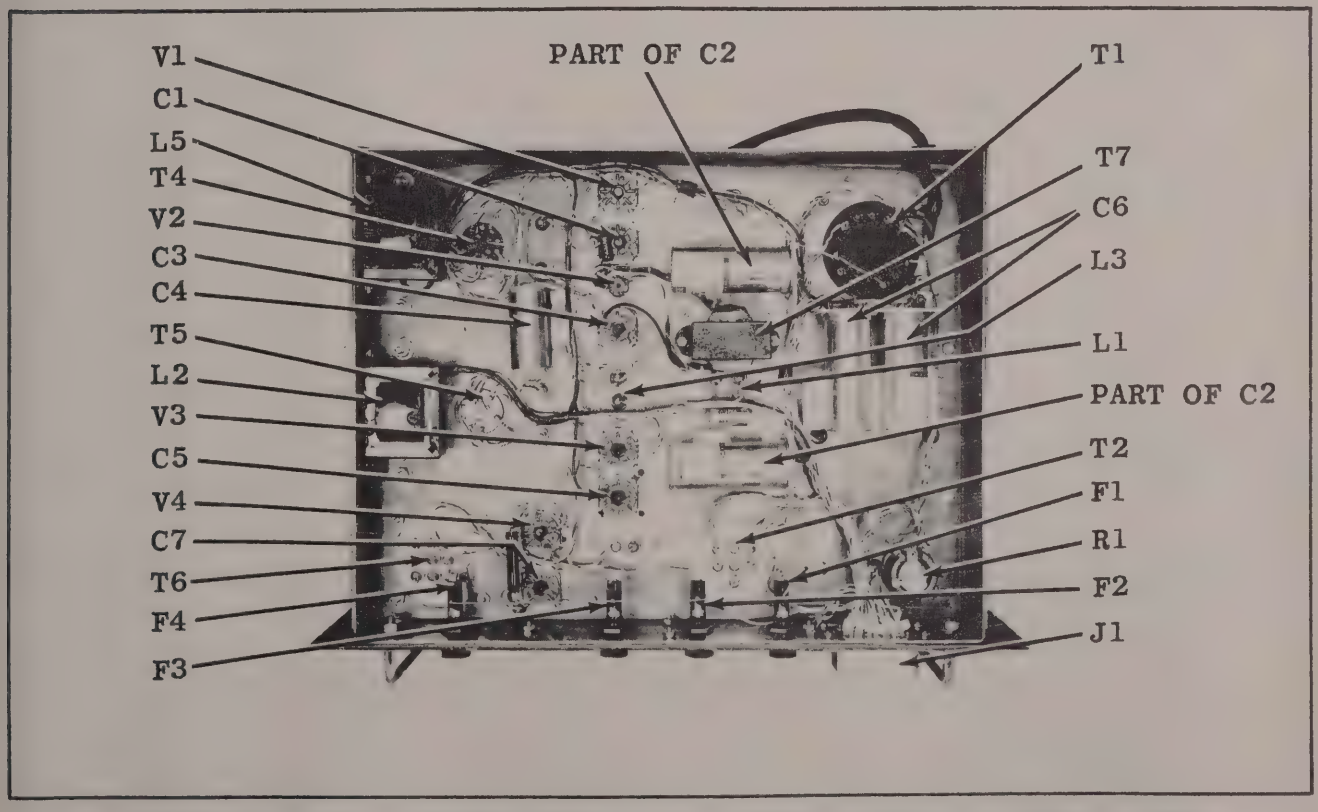


FIGURE 4.20C. TRANSMITTER L.V. POWER SUPPLY (BOTTOM VIEW)

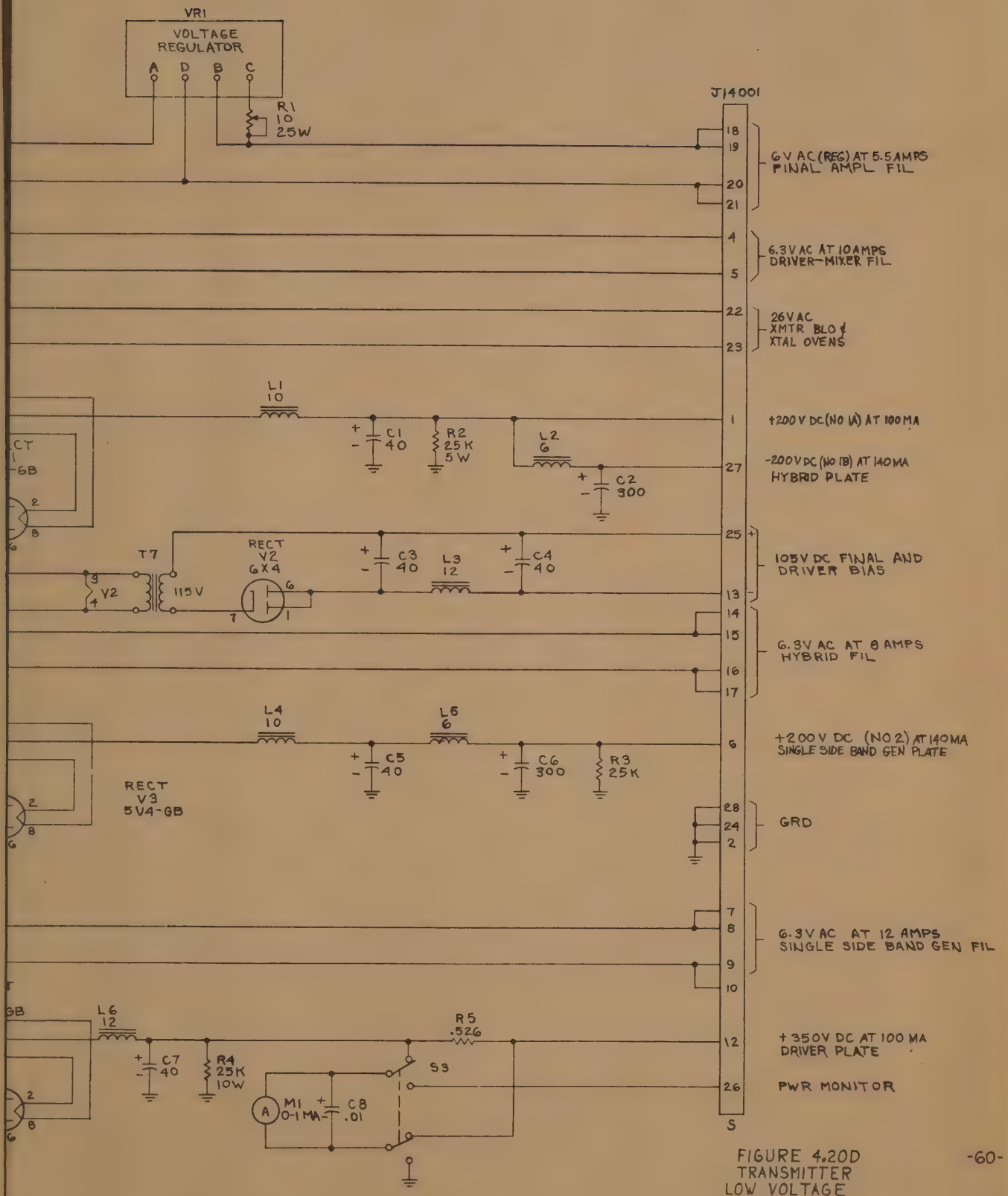
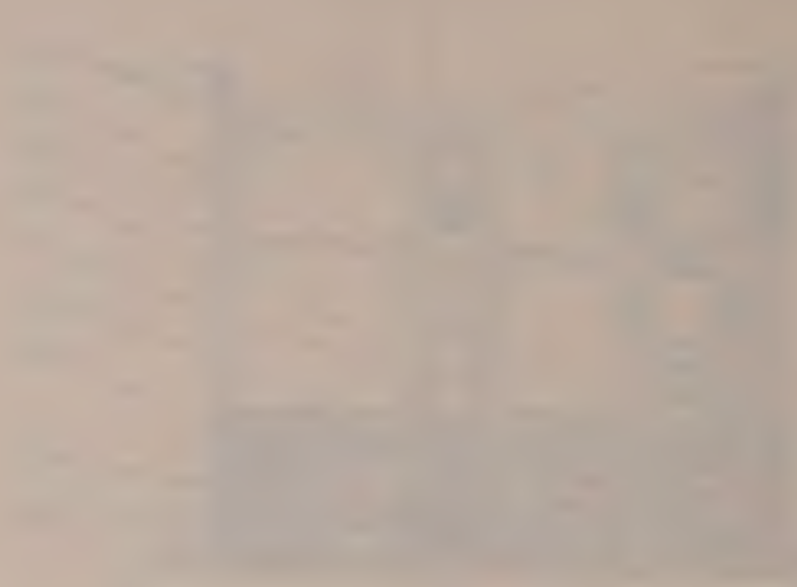
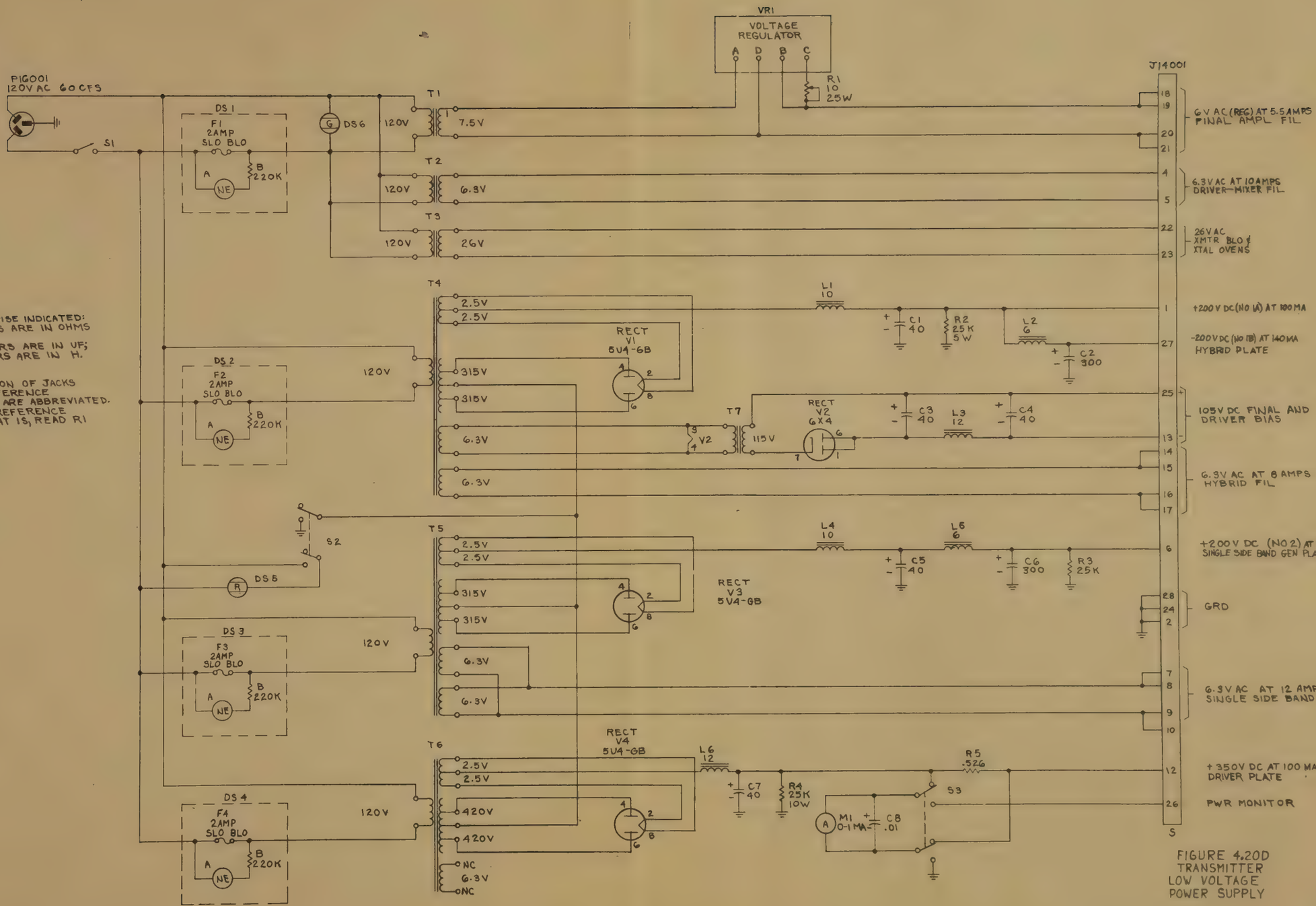


FIGURE 4.20D
TRANSMITTER
LOW VOLTAGE
POWER SUPPLY





NOTES

1. UNLESS OTHERWISE INDICATED: ALL RESISTORS ARE IN OHMS ±10%; ALL CAPACITORS ARE IN UF; ALL INDUCTORS ARE IN H.
2. WITH EXCEPTION OF JACKS AND PLUGS, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 14000 TO REFERENCE NUMBERS; THAT IS, READ R1 AS R14001.

FIGURE 4.20D
TRANSMITTER
LOW VOLTAGE
POWER SUPPLY

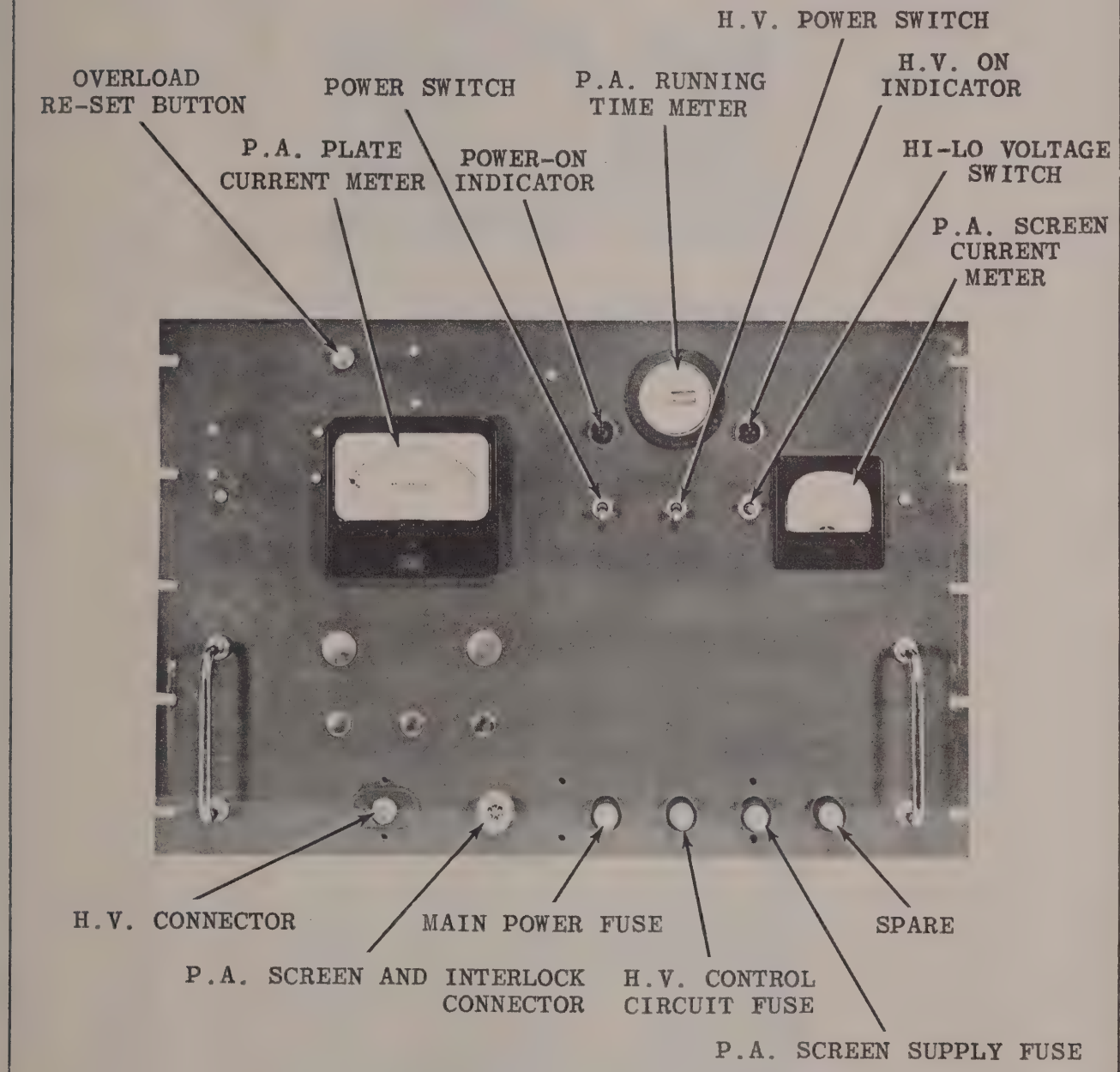


FIGURE 4.21A. TRANSMITTER H.V. POWER SUPPLY (FRONT VIEW)

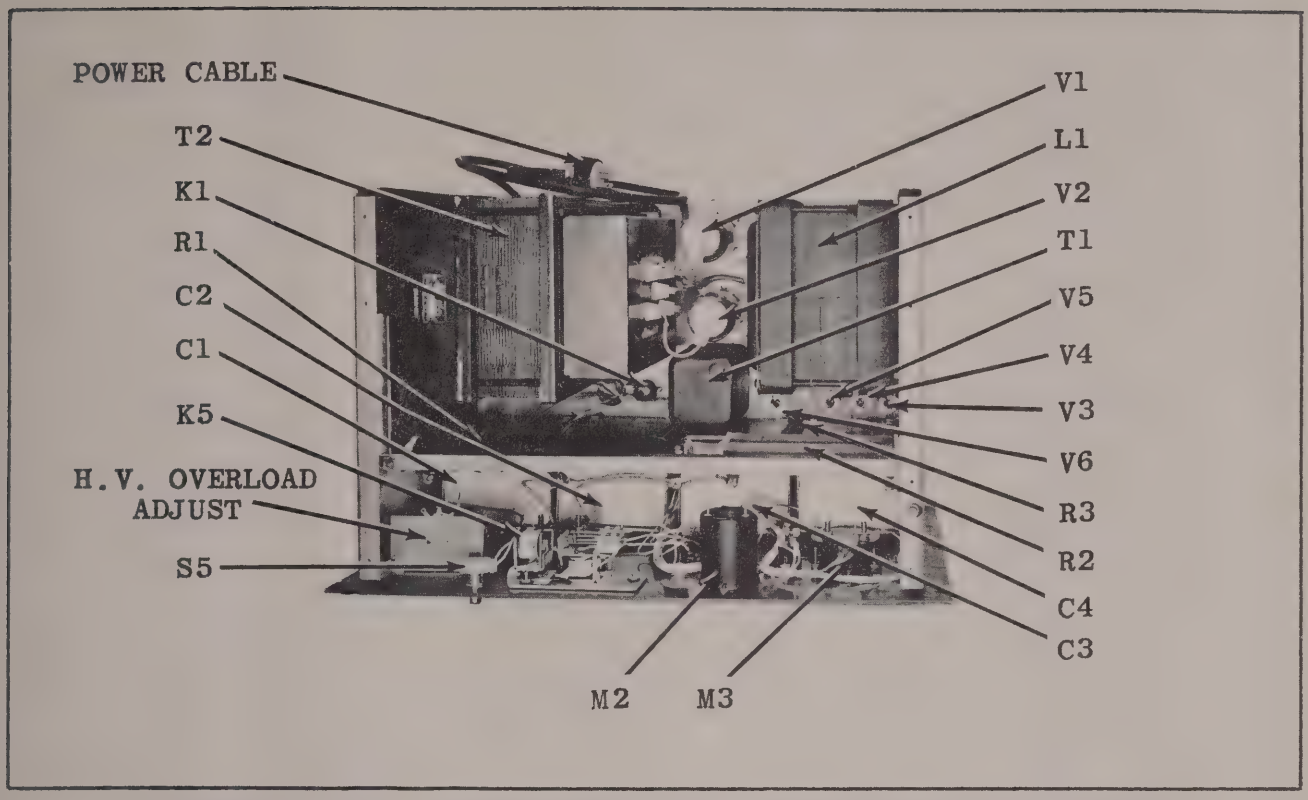


FIGURE 4.21B. TRANSMITTER H.V. POWER SUPPLY (TOP VIEW)

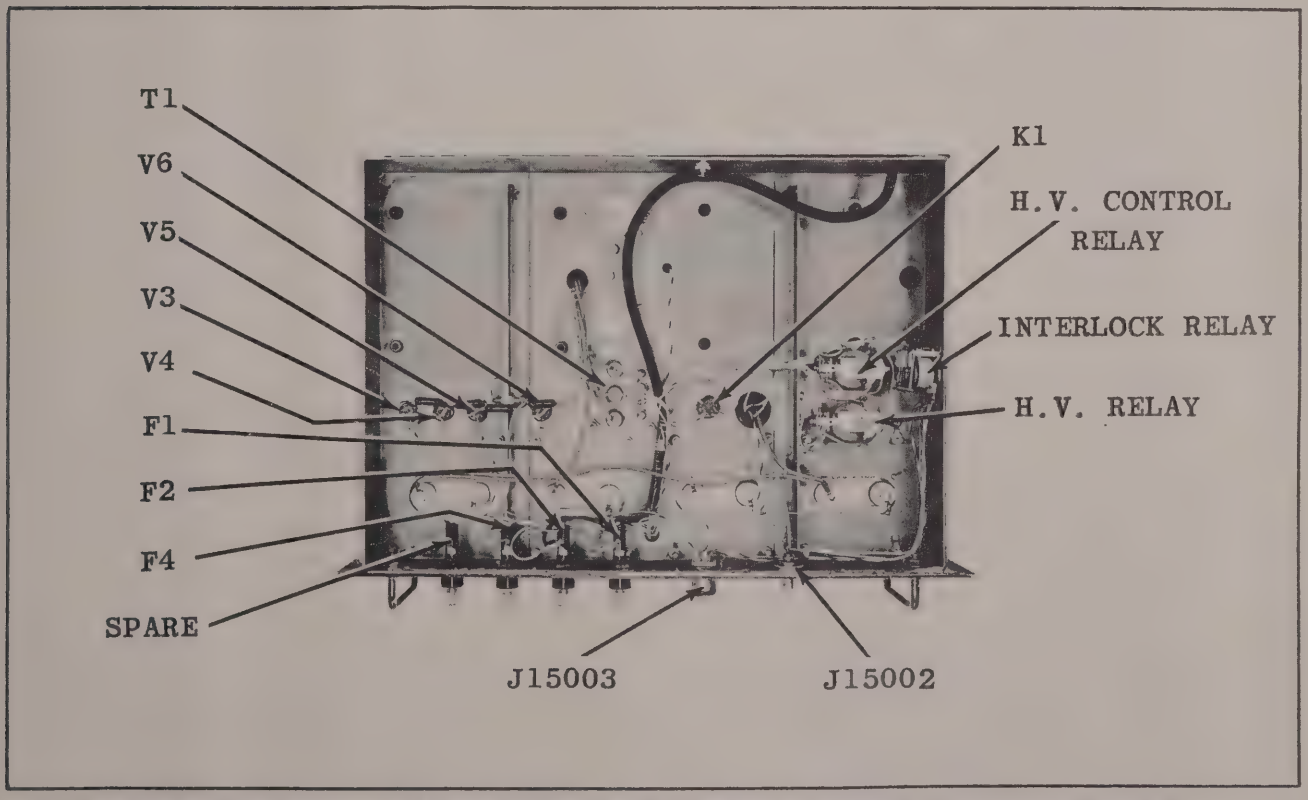


FIGURE 4.21C. TRANSMITTER H.V. POWER SUPPLY (BOTTOM VIEW)

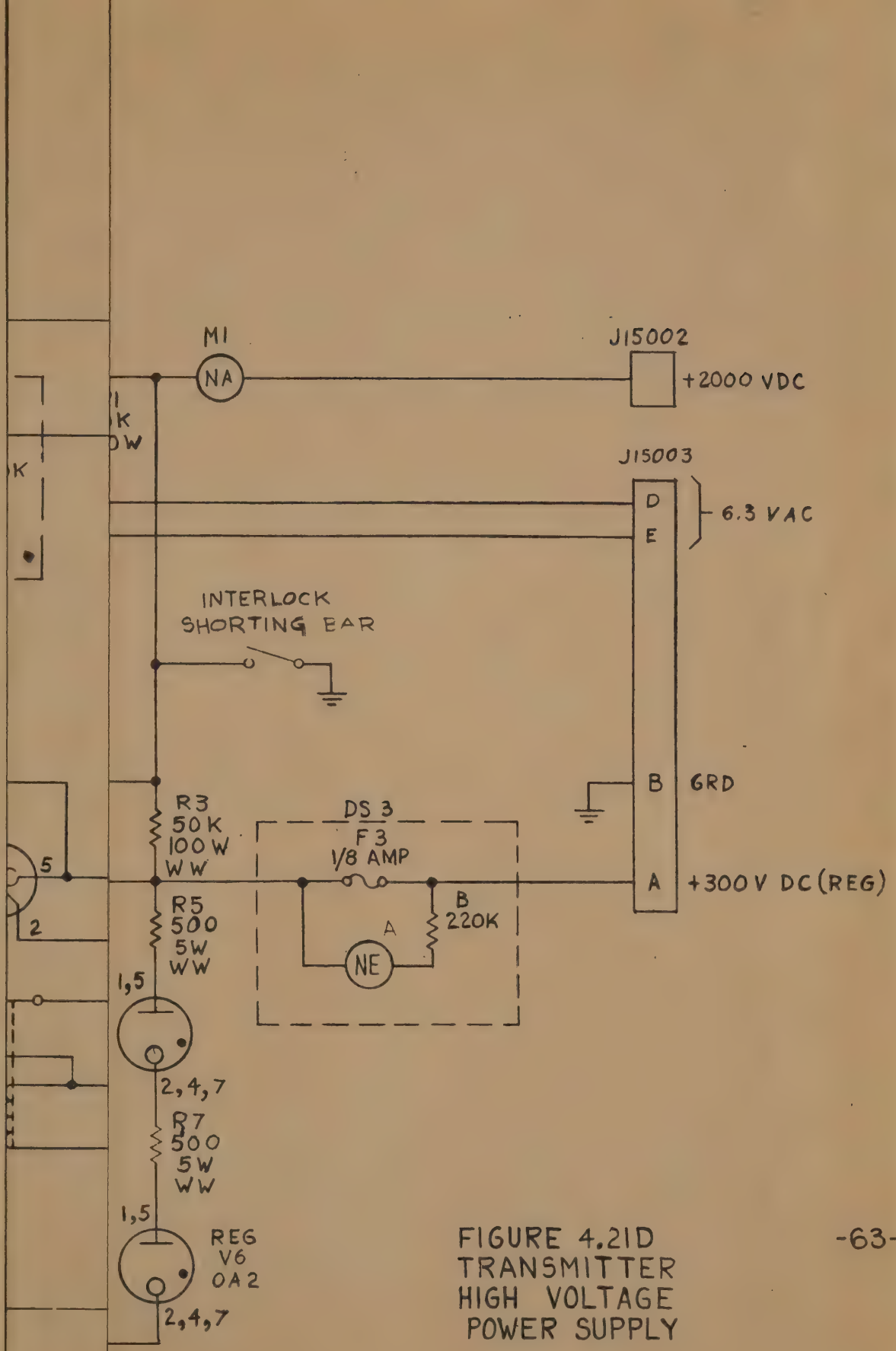
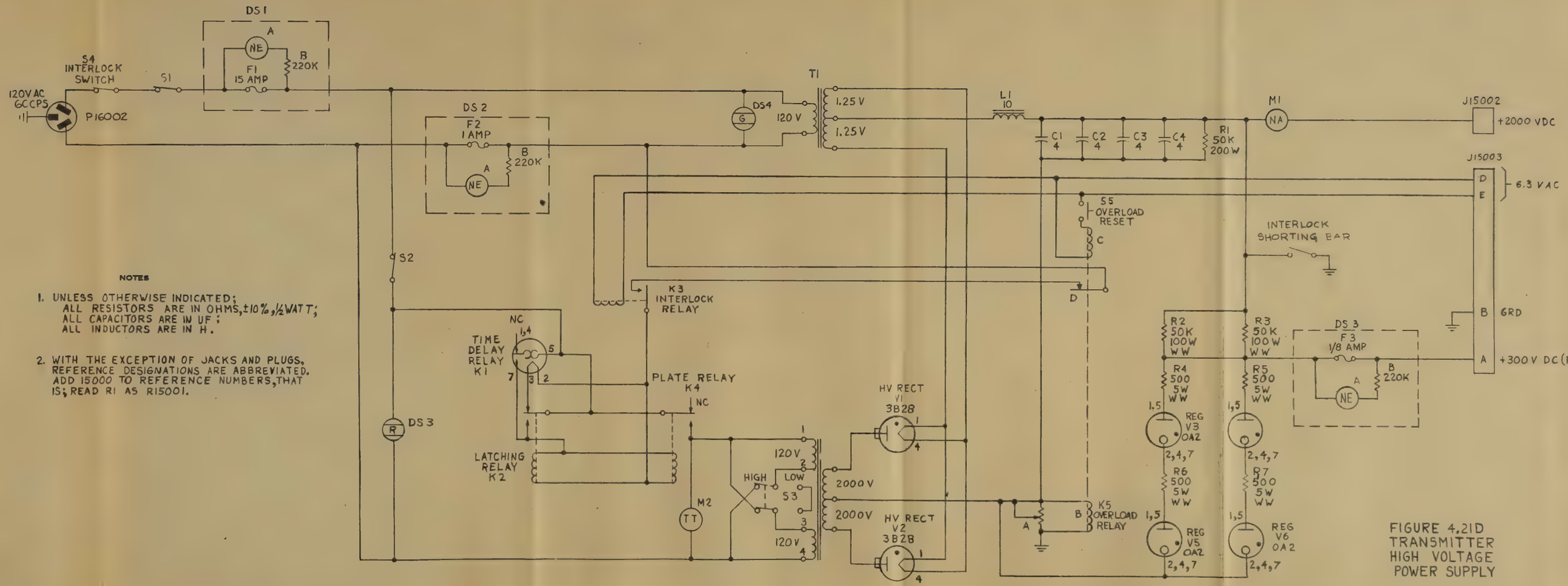


FIGURE 4.21D
TRANSMITTER
HIGH VOLTAGE
POWER SUPPLY



NOTES

1. UNLESS OTHERWISE INDICATED;
   ALL RESISTORS ARE IN OHMS, ±10%, ½WATT;
   ALL CAPACITORS ARE IN UF;
   ALL INDUCTORS ARE IN H.

2. WITH THE EXCEPTION OF JACKS AND PLUGS, REFERENCE DESIGNATIONS ARE ABBREVIATED. ADD 15000 TO REFERENCE NUMBERS, THAT IS; READ R1 AS R15001.

FIGURE 4.21D
TRANSMITTER
HIGH VOLTAGE
POWER SUPPLY

SPARE PARTS LIST

CENTRAL STATION

ITEM	MANUFACTURER AND PART NUMBER	QUANTITY
Tube	6BH6	17
Tube	6201	6
Tube	6AL5	2
Tube	6AK5	4
Tube	6Y6	2
Tube	Amperite 6360	1
Tube	OA2	3
Tube	6X4	1
Tube	12AX7	1
Tube	5963	3
Tube	SU4	2
Tube	Eimac 4CX300A	2
Tube	3B28	1
Connector	Cannon, DPD28-33S-1G	1
Connector	Cannon, DPD28-34P-1G	1
Connector	Cannon, DPD232C-33S-1G	1
Connector	Cannon, DPD232C-34P-1G	1
Connector	Cannon, DB25P	1
Connector	Cannon, DB25S	1
Connector	Cannon, DA15P	1
Connector	Cannon, DA15S	1
Connector	Continental C9-20P	1
Connector	Continental C9-20S	1
Connector	Continental C7-20P	1
Connector	Continental C7-20S	1
Phono Pin Plug	Motorola	1
GS02-14S-6P-301	Amphenol	1
GS02-14S-6S-301	Amphenol	1
Connector	IPC, UG/556/U	1
Connector	IPC, UG/932/U	1
Connector	IPC, #27025	1
Connector	IPC, UG/1094	1
Connector	IPC, UG/909/U	1
Connector	IPC, UG/88/U	1
Connector	Cannon, DIC 3069	2
Connector	Cannon, DIC 3068	2
Power Plug	Amphenol	1
Switch, DPDT Center off	Arrow-Hart and Hegeman	1
Switch, DPDT Heavy duty	Arrow-Hart and Hegeman	1
Switch, DPDT	Arrow-Hart and Hegeman	1

ITEM	MANUFACTURER AND PART NUMBER	QUANTITY
Permakay Filter	Motorola, 6686Kc 1020	1
Permakay Filter	Motorola, 8530Kc 1024	1
Mechanical Filter	Motorola, 420Kc	1
Mechanical Filter	Motorola, 426Kc	1
Mechanical Filter	Motorola, 432Kc	1
Mechanical Filter	Motorola, 438Kc	1
Mechanical Filter	Motorola, 444Kc	1
Mechanical Filter	Motorola, 450Kc	1
Mechanical Filter	Motorola, 456Kc	1
Mechanical Filter	Motorola, 462Kc	1
Mechanical Filter	Motorola, 468Kc	1
Variable Capacitor	E. F. Johnson, 30M8	2
Variable Capacitor	E. F. Johnson, 9M11	1
Variable Capacitor	E. F. Johnson, 5MB11	1
Variable Capacitor	E. F. Johnson, 25LB15	1
Variable Capacitor	Hammarlund, MAPC75	1
Pilot Light bulb #313	General Cement	1
Pilot Light bulb 6W-115V	General Cement	1
Fuse	Little Fuse, 3AG5A	2
Fuse	Little Fuse, 3AG 1/8A	2
Fuse	Little Fuse, 3AG 1/4A	5
Fuse	Little Fuse, 3AG 10A	3
Fuse	Little Fuse, 3AG 15A	2
Fuse	Little Fuse, 3AG 1A	2
Fuse	Little Fuse, 3AG 2A	2
Fuse	Little Fuse, 3AG 3A	2
Fuse	Little Fuse, 3AG 1/2A	2
Relay	Elgin, VGG2C26.5 VDC	5
Relay	North Electric, 226ACC804A	5

ITEM	MANUFACTURER AND PART NUMBER	QUANTITY
Relay	Guardian, Overload X300-ER	1
Relay	Guardian, SPDT 6.3v and Coil #200 MI	1
Relay	Advance, PC/K/115A SPDT	1
Relay	Curtiss-Wright, 117-40-DF	1
Crystal Oven 24v	Hunt	1
Crystal Oven 24v	Motorola	5
Coil	Motorola, 450Kc	2
Coil	Motorola, 450K Balanced Mod.	2
Coil	Motorola, 156Mc	1
Regohm 6v	Electric Regulator Corp.	1
Diode	Motorola, MN14	1
Diode	Transitron, 1N341	1
Diode	Hughes Aircraft, HD2149	10
Diode	Raytheon, 1N432A	7
Diode	Raytheon, 1N303A	1 pr.
Transistor	General Electric, 2N167	1
Transistor	Western Electric, 2N110	2
Transistor	Raytheon, 2N64	1
Transistor	General Electric, 2N43	1
Vibrasender	Motorola, 473.2 cycles	1
Vibrasender	Motorola, 524.8 cycles	1
Vibrasender	Motorola, 582.1 cycles	1
Vibrasender	Motorola, 645.7 cycles	1
Vibrasender	Motorola, 716.1 cycles	1
Vibrasender	Motorola, 749.3 cycles	1
Vibrasender	Motorola, 881.0 cycles	1
Vibrasender	Motorola, 977.2 cycles	1
Vibrasender	Motorola, 1084.0 cycles	1
Vibrasender	Motorola, 100.0 cycles	1
Vibrasender	Motorola, 110.9 cycles	1
Vibrasender	Motorola, 123.0 cycles	1
Vibrasender	Motorola, 136.5 cycles	1
Vibrasender	Motorola, 151.4 cycles	1
Vibrasender	Motorola, 167.9 cycles	1
Vibrasender	Motorola, 186.2 cycles	1
Crystals	Tedford, 6.6288 mc CR-36/U	1
Crystals	Tedford, 8.0815 mc CR-36/U	1
Crystals	Tedford, 29.93920 mc CR-32/U	1
Crystals	Tedford, 29.92560 mc CR-32/U	1
Crystals	Monitor, 420 Kc CR-47/U	1
Crystals	Monitor, 426 Kc CR-47/U	1
Crystals	Monitor, 432 Kc CR-47/U	1
Crystals	Monitor, 438 Kc CR-47/U	1
Crystals	Monitor, 444 Kc CR-47/U	1
Crystals	Monitor, 450 Kc CR-47/U	1
Crystals	Monitor, 456 Kc CR-47/U	1
Crystals	Monitor, 462 Kc CR-47/U	1

ITEM	MANUFACTURER AND PART NUMBER	QUANTITY
Crystals	Monitor, 468 Kc CR-47/U	1
Crystals	Monitor, 342 Kc CR-47/U	1
Crystals	Monitor, 392.593 Kc CR-47/U	1
Crystals	Monitor, 398.148 Kc CR-47/U	1
Crystals	Monitor, 404.166 Kc CR-47/U	1
Crystals	Monitor, 409.722 Kc CR-47/U	1
Crystals	Monitor, 416.666 Kc CR-47/U	1
Crystals	Monitor, 481.944 Kc CR-47/U	1
Crystals	Monitor, 487.500 Kc CR-47/U	1
Crystals	Monitor, 494.444 Kc CR-47/U	1
Crystals	Monitor, 498.611 Kc CR-47/U	1